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# THE SURGICAL CLINICS OF NORTH AMERICA

Volume 8

Number 2

## CLINIC OF DR. JOHN F. IRDMAN

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### OPERATIVE PROCEDURES IN THE FIBROID UTERUS<sup>1</sup>

No woman should be operated upon because she has a fibroid. Every woman with a fibroid should be operated upon or have x-ray or radium treatment who presents one or more of the conditions mentioned further on in this article. In view of the infrequency of carcinoma occurring as an associated condition with fibroids, the argument of carcinoma possibilities should not be used to force the patient to be operated upon without explaining the relative infrequency.

No discussion of the use of radium or x-ray or both in this type of case is to be entertained in this paper except to admit the use of either or both agents in all fibroids of single type involving the body musculature provided the tumor mass be under the fourth month pregnancy size and not in the patient under forty who still hopes for an heir.

Operation is advocated for all symptom bearing multiple tumors irrespective of size and for all single tumors in the child bearing period over three and a half to four months pregnancy size.

It is conceded that operation (the radical removal subtotal or total hysterectomy) prevents conception. The same must be said of the use of radium or x-ray treatment. Furthermore the operative procedure has the advantage over the x-ray and radium treatment of not placing the woman in a condition of complete menopause as these agents destroy all function of the ovaries.

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in the great proportion to proceed with household or business duties in three to five weeks instead of dragging out a prolonged treatment for months. Furthermore it is the working class to day who are unable to pay the prices in private practice for the radium and x ray treatment but who can elect a hospital with free or relatively cheap accommodations at all times.



FIG. 5.—Corkscrew or other holding device in or on the uterus. First pair clamps on broad ligament and cutting between them ready to place the lower set.

The operation as we perform it on my service. After properly walling off the field grasping the uterus with a corkscrew, large volcellum or with artery clamps on the broad ligaments, cutting down on the one side between two clamp placed one juxtaputerine the other on the broad ligament cutting between following down in this manner until the cervix is reached the last pair of clamp seizing the uterine artery (Figs. 75, 76). The

while conservative operation retaining one or both adnexa will be followed by a gradual menopause symptomatology

The operative procedure is further indicated in those patients who present a picture of

- 1 Massive bleeding frequent irregular or leaking
- 2 Urinary frequency and night rising
- 3 Gastro intestinal distress often due entirely to pressure upward
- 4 Pressure symptoms backache pelvic pain edema of extremities etc
- 5 Recurring attacks of abdominal pain simulating peritonitis possibly due to friction
- 6 Rapid growing tumors
- 7 Exceptional size with relatively no symptoms
- 8 Size reflecting on the bearer if unmarried or widowed
- 9 Cardiac changes more frequently shown by blood pressure increase etc

Malignancy as a reason for operating is not used by me but the irritative possibilities and remote degenerations mucoid necrosis etc must be considered

When for good reasons a myomectomy can be done with safety I am inclined to give the child bearing patient this preference. Malignancy in these patients when present has been of the sarcoma type more frequently than carcinoma

In a previous paper (New York Medical Journal May 12 1917) I reported 334 hysterectomies with 2 deaths. From January 1 1917 to January 1927 I have done 495 subtotals with 6 deaths and 714 complete with 3 deaths or a total in the past ten years of 109 operations with a mortality of 8%. Adding our previous 334 with 2 deaths there is a total of 1043 hysterectomies with 10 deaths a mortality of less than 1 per cent. Of the 10 deaths 3 were operations following the use of radium or x-ray when nothing desirable had been accomplished.

The operative treatment while excepting a small risk of death possibly equalled by radium and x-ray has many advantages particularly in the working class. The absolute repair in two weeks barring the occasional infection. The ability

peritoneum is pushed down on the cervix by cutting transversely from the clamped side to the opposite side the cervix is then cut through to the uterine artery which can be seen the other side if care be taken (Fig. 78) The cervix cut across the artery and broad ligament are grasped from below upward and cut between proceeding upward until the broad ligament is entirely cut through (Fig. 78-80)

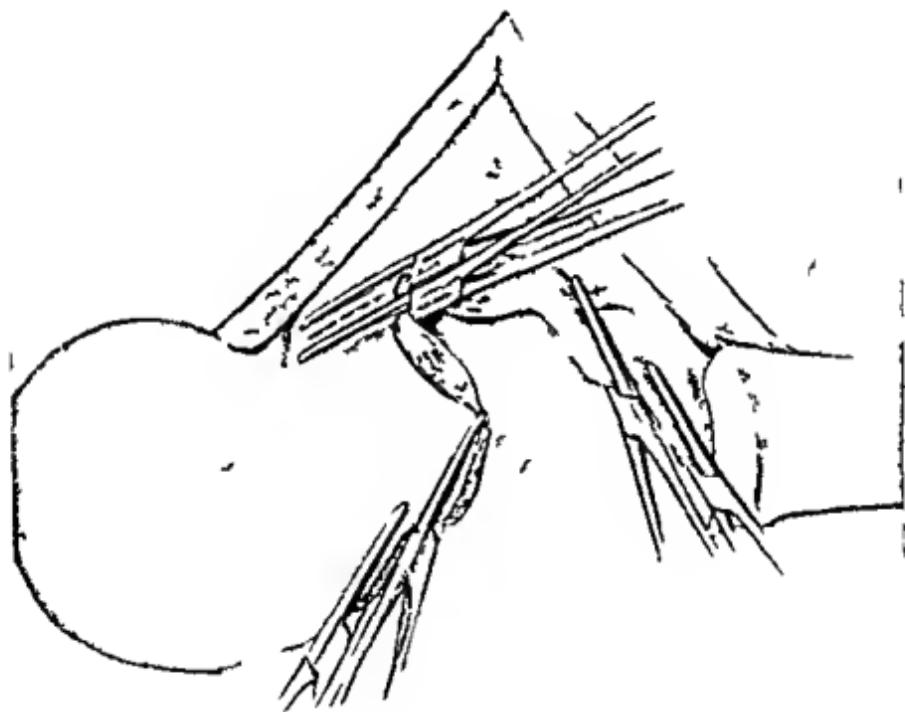


Fig. 78.—Broad ligament of one side bisected from above down and cervix cut through and clamp being applied from below upward on the opposite side. Clamp on one side shows uterine artery included in the clamp.

In the subtotal operation a running catgut suture—beginning about the uterine artery where it has been tied—is then applied through the broad ligament enclosing the clamp as the suture reaches the end of the clamp bite the clamp is removed and the suture drawn and tied with the end at the uterine artery (Fig. 81) This method of suture is continued over the clamp until

the broad ligament is finished with the sutures (Figs. 82-84). The finished broad ligament is then attached to the cervix stump and the other ligament attached with the suture etc (Fig 85). Figure 86 shows the finished suture of the broad ligaments to the cervical stump. The cervical canal has previously been cauterized or reamed out and the peritoneal toilet completed.



Fig. 84. Bodily method of reducing the broad ligament on the opposite side being held upward.

When doing a complete operation the method of procedure is from the time up to the time the uterus has been removed the next step is pulling the peritoneum and bladder down from the cervix and uterina so that a transverse incision can be made into the vaginal vault and the anterior lip of the cervix grasped in a pair of double toothed volvella then rotating the cervix on its trans-

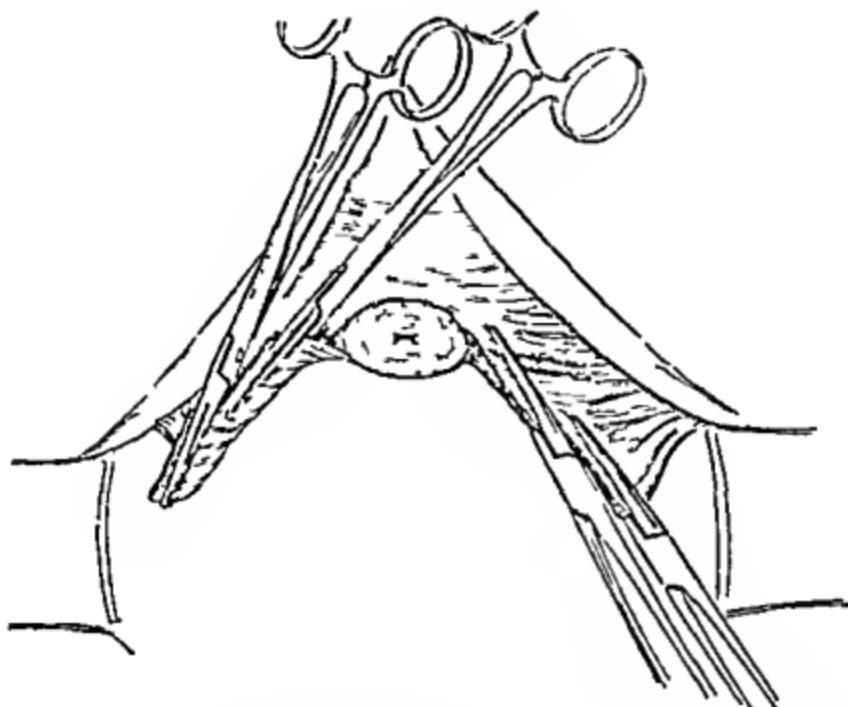


Fig. 80.—Subtotal hysterectomy. Uterus removed. Clamps on both broad and round ligaments

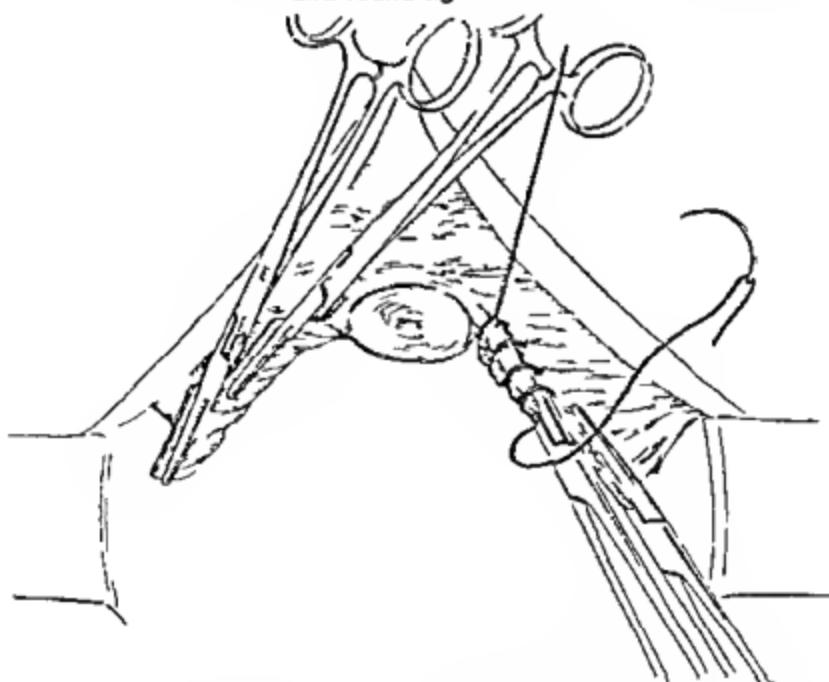


Fig. 81.—Running suture applied over distal clamp having been tied at its starting point (around the uterine artery)

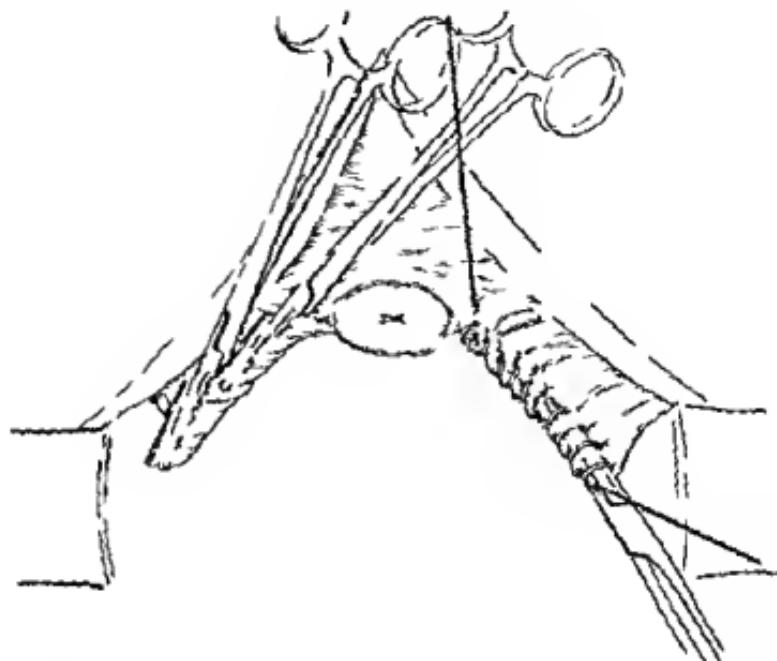


Fig 82.—Suture applied to impacted fibrotubercular bone.

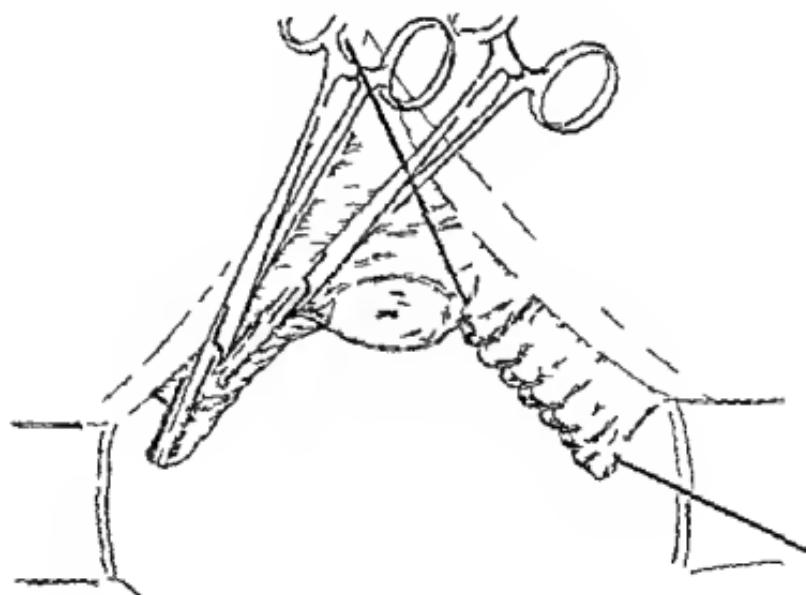


Fig 83.—Suture applied to clavicular process.

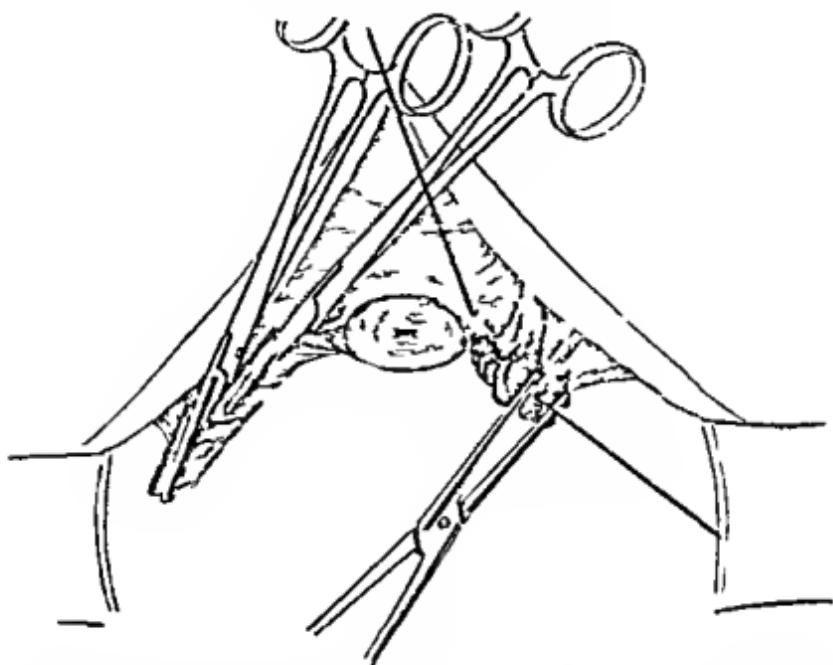


Fig. 84.—Subtotal hysterectomy. Suturing of broad ligament completed. Forceps used to shift the ligament close to the suture starting point then tying in order.

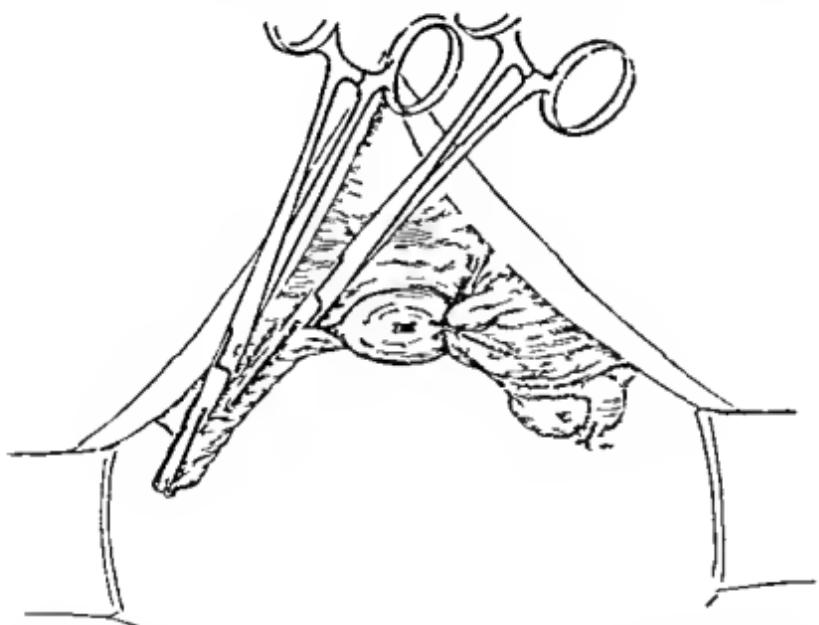


Fig. 85.—(1) Subtotal hysterectomy. Broad ligament sutured on completed ready to attack the opposite end. (2) Complete hysterectomy. The broad ligament sutured to the vaginal vault.

verse axis and ablating it from the vagina (Figs. 88-91). After ablation the vaginal wall is sutured, this stops the major portion

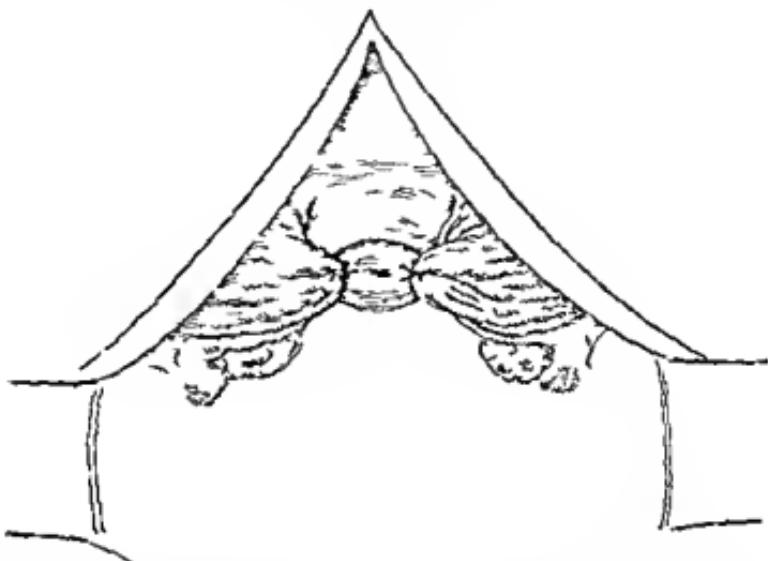


Fig. 86—Subtotal hysterectomy. Fundal suture ligature of broad ligament attachment to the cervix

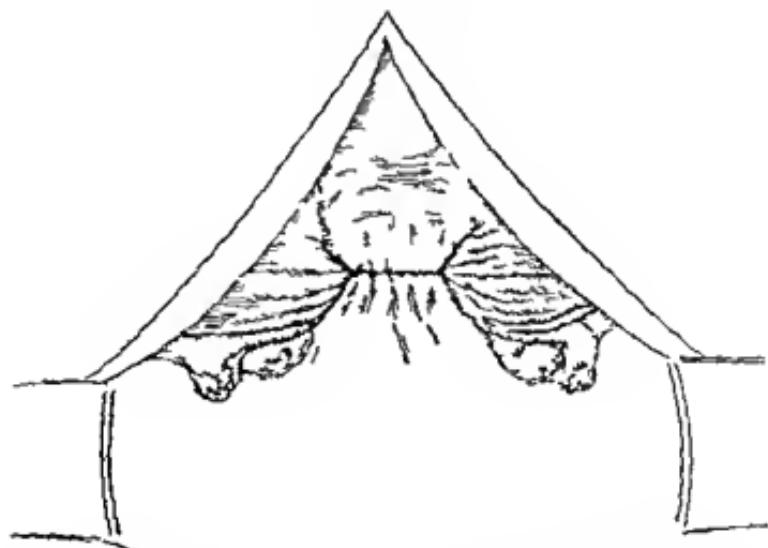


Fig. 87—Fundal suture to close the vault in the complete or subtotal hysterectomy

of the oozing (Fig. 92). The vault having been closed we proceed with the broad ligament suture as in the subtotal opera-

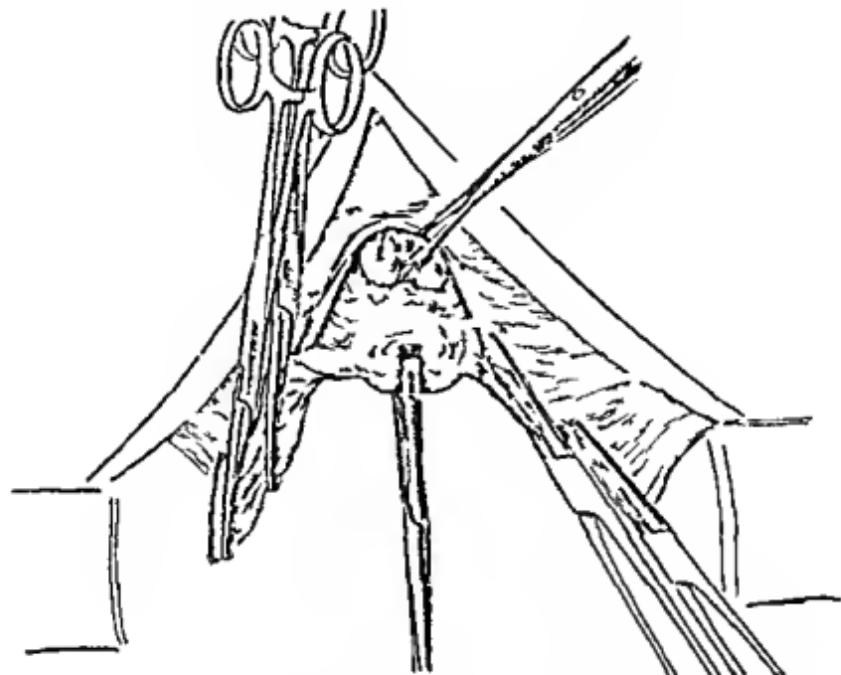


Fig 88.—Complete hysterectomy. The peritoneum and bladder being pushed off the cervix and anterior vaginal wall

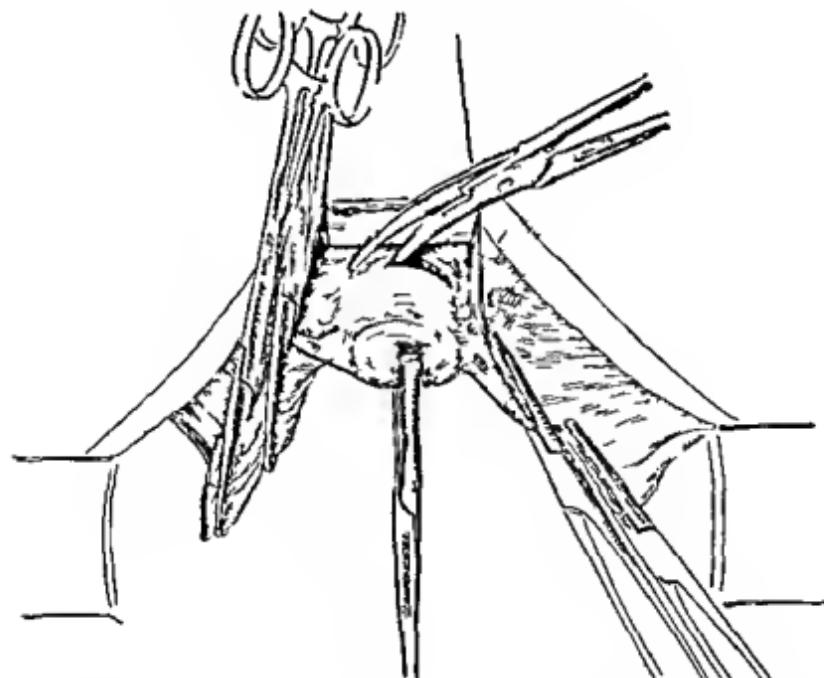
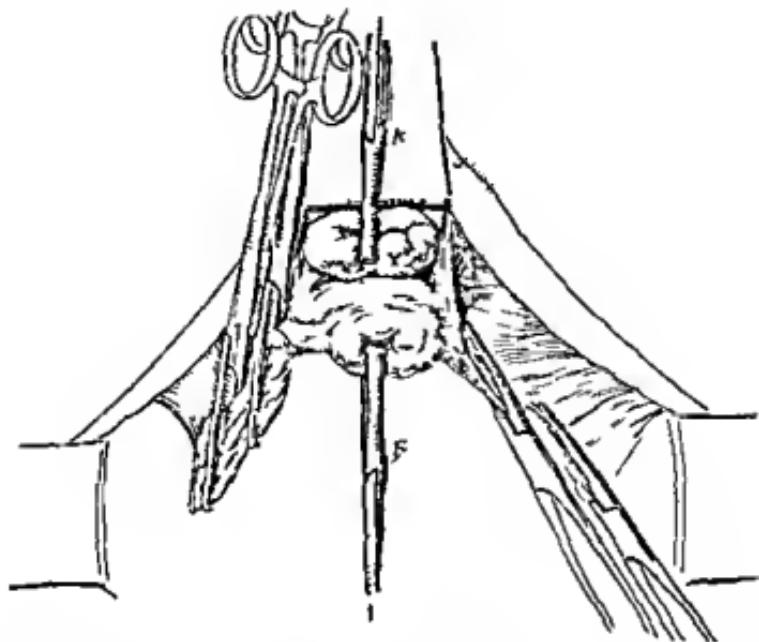
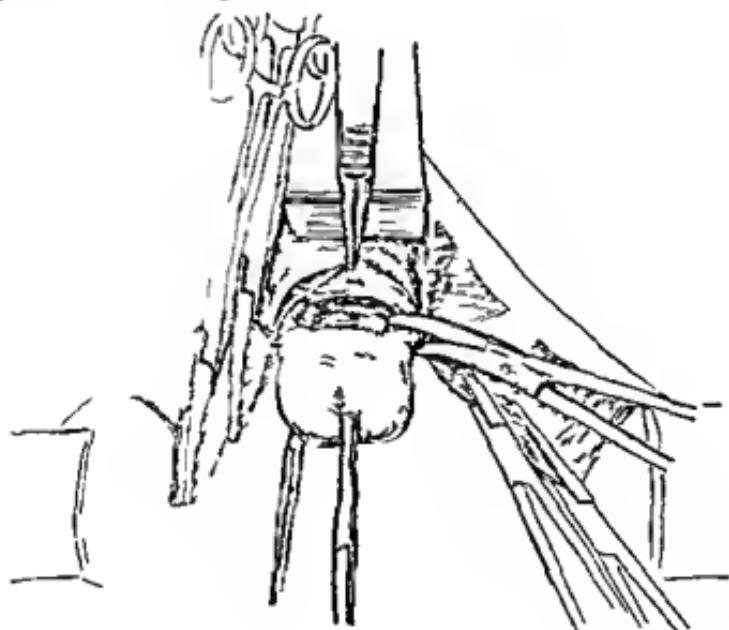


Fig 89.—Complete hysterectomy. The cervix and vaginal wall having been cleared of peritoneum and bladder the transverse vaginal incision is being made



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posed th pel ca ty Th f ps(A) g p th r v dd locat  
t th gh th g l p g B p t th m pl t ly t t d  
th gh th lt th g



Fg 91—Cmpl t h t ect m C bo t t be m d by c tt g  
th m g (t ) w ll

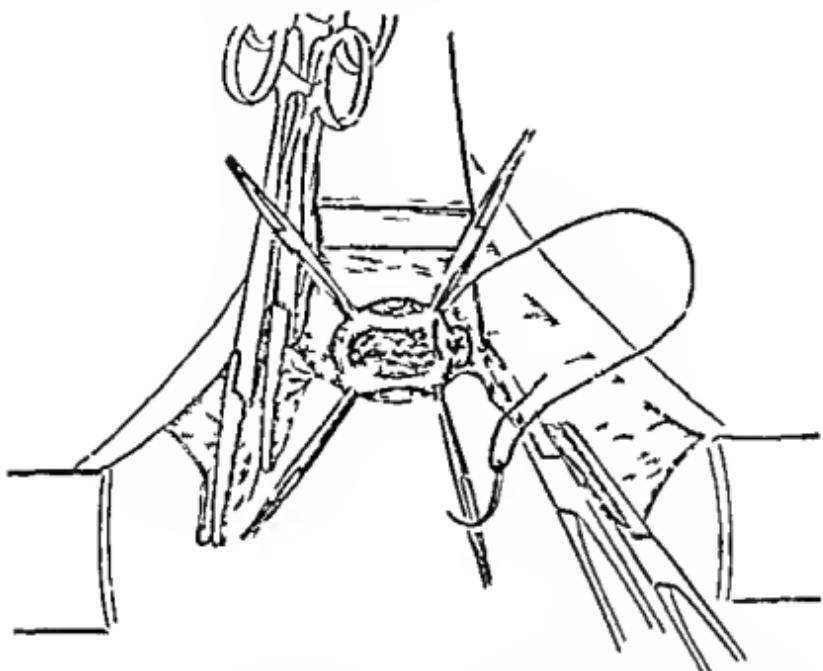


Fig 92.—Complete hysterectomy. Vaginal wall being held by four forceps  
Suture begun at one side

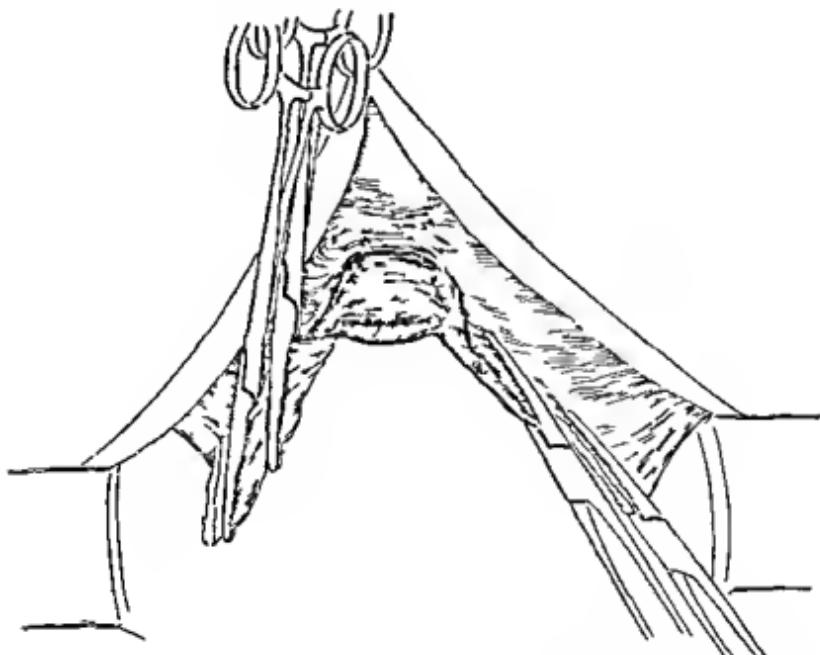


Fig 93.—Complete hysterectomy. Vaginal wall sutured next step suture  
ligation of both broad ligaments

tion finally attaching the stumps to the sutured vault finishing the peritoneal toilet as in Fig. 84.

It is my custom at the operation to do a complete hysterectomy in every patient with the cervix lacerated. Primarily because of the disagreeable leukorrhea persistent in many patients in whom the cervix is retained and second because of the possibility of malignant degeneration in the retained cervix which is rated at about 7 per cent of all of the retained cervices although this percentage therefore presents a minimal possibility. Based upon the malignant argument I would advise the occasional operator to do a subtotal with reaming out or cauterizing the cervical canal of the remaining stump.

It has been my custom for eight or ten years to retain all the adnexa in a patient under fifty provided she is not in or through the menopause at the time of operation. Formerly I retained the ovaries or an ovary being careful to sacrifice the tubes fearing a hydrosalpinx etc. at a remote period. Now in the event of there being no gross lesion (visible) of either ovary or tubes great care is taken for their retention.

I am satisfied that in the past ten years my experience with this procedure of conservation the menopause onset is delayed or not so profound as it was in the patients in whom I formerly sacrificed the tubes. This clinical feature can only be explained on the grounds of retained nerve and vessel supply when conservation of the tubes is practised. Naturally if the adnexa are obviously involved they are removed. Further in follow ups in these patients I have not had sufficient secondary operations for cyst etc. to cause me to change my present procedure.

It is also my procedure to investigate carefully the gall bladder and to remove the appendix when present. The gall bladder is either operated upon if it contains stones or the knowledge of the presence of stones is transmitted to some member of the family with instructions as to future intervention.

While I am not strongly disposed to argue malignancy in cholelithiasis I cannot but call attention to one patient operated upon five years ago in whom I made a record of three fairly large stones in the gall bladder not removed at the time of the hys-

terectomy because of the patient's physical condition at that time. She was informed of the condition and of the advisability for operation at a later date. I never saw her after her discharge until the fall of 1926 five years after the hysterectomy complaining that her gall stones had been working overtime for about three months and that she had a very tender lump in her right side. Upon examination it was first supposed that she had an acute cholecystitis but when under ether a definite nodular mass was readily felt and the diagnosis changed to malignancy. Abdominal section revealed an absolutely inoperable carcinomatous gall bladder with hepatic metastasis.



## SURGERY OF THE GALL BLADDER<sup>1</sup>

SURGERY of the gall bladder today constitutes one of the most frequent appeals to the general abdominal surgeon, and should be considered under two general types of operation. I feel that thoroughly to encompass my topic duet surgery must owing to its close association with the gall bladder be included. Gall bladder surgery consists of the time honored subject—unsettled by many operators—as to choice of cholecystostomy and cholecystectomy. Without an apology I shall dismiss the subject of cholecystostomy with a merited but brief set of arguments.

I do not do a cholecystostomy except in the event of a definite or suspected carcinoma obstructing the flow of bile into the intestine. To be efficacious a cholecystostomy in this instance must be below the junction of the cystic and hepatic as these two enter into the formation of the common duct. Obstruction above this point will not be benefited by a cholecystostomy. Obstruction of this type will be dealt with in the consideration of hepatic duet surgery.

I do not do cholecystostomy in acute cholecystitis except in the rarest of instances those extremely ill patients who would by their physical condition permit of nothing but local anesthesia and I am quite positive that this type of patient occurs in my clinic and practice less than  $\frac{1}{2}$  per cent of all my gall bladder operations.

Nor do I do a cholecystostomy fearing to do the radical from the infection aspect as a preliminary stage. I found years ago that those patients with purulent or gangrenous gall bladder do far better with the primary cholecystectomy than a cholecystostomy to be followed by a second surgical trauma. Also that the removal of the infected area is followed by a very short and sharp convalescence.

<sup>1</sup> Read before the Connecticut State Medical Society Clinical Congress September 20 1927 before the American College of Surgeons Pennsylvania New Jersey Delaware Section Meeting Wilmington Del January 17 1928

Furthermore an acute gall bladder has been prepared for early removal by the very process of inflammation. The walls become edematous and a rapid finger dissection is made after the serosa is incised. This type of gall bladder lends itself to a spectacular delivery due to the facility in stripping the peritoneal coats from the submucosa and mucosa.

My indications for a cholecystostomy as mentioned before are when a definite malignancy or suspected malignancy occurs or when an obstruction to the outflow of bile is situated below the cystic duct. Besides being due to malignancy the obstruction may be a stenosis from scar or fibrous tissue, may be an unrecognized and non dislodgable stone in the pancreatic portion of the duct or may be due to a pancreatitis producing sufficient pressure on the duct to obstruct it. Our most frequent cause of duct obstruction distal to the cystic duct is carcinoma of the papilla of Vater.

In any of these types of obstruction cholecystostomy either permanent or temporary is indicated. In preference to doing the classical cholecystostomy in this condition I am advising and doing that operation which makes a permanent bypass between the duodenum or stomach and the gall bladder: a cholecystoduodenostomy or cholecystostomastostomy and giving preference to the latter.

This preference is not based on a physiologic reason but upon the surgical facility plus the experience gained in having done this operation many times finding that there is no gastric irritation following nor any apparent deviation in the physiology of digestion.

The surgical facility is demonstrable as soon as the abdomen is opened. The pyloric antrum of the stomach is in view and well within operable reach without the necessary trauma that is demanded when one mobilizes the duodenum for anastomosis. Again the fundus of the dilated gall bladder lays over or on the stomach while in doing the operation of cholecystoduodenostomy one must bury the fundus well down in the abdominal cavity.

Bear in mind in this type of obstruction to the outflow of

bile. We have in over 80 per cent a well dilated non inflamed gall bladder Courvoisier's law being well carried out, while in the obstruction above the terminal portion of the cystic duct those patients in whom this type of operation is not indicated we find as a rule a small atrophied or contracted gall bladder. This latter type of gall bladder obtains in the fluctuating obstructions due to stone in the common duct. Therefore upon opening the abdomen (if no enlargement has been palpated before the gall bladder is found large and non inflamed) search for the obstruction distal to the junction of the cystic and hepatic ducts. If the gall bladder is found small (empty or partially so, contracted or atrophied) search above the cystic duct in the event of no stone being present in the common duct. In the event of an acute pancreatitis being present with edema of the entire neighborhood then a cholecystostomy not only may but should be performed.

To summarize Cholecystostomy is done only when (a) there is a definite use of the gall bladder as a means of making a by way or (b) as a means for drainage as in case of pancreatitis associated with edema that masks or makes impossible the diagnosis of the immediate obstruction. The objection on my part and that of the greater number of operators to doing cholecystostomy in the non malignant obstruction and inflamed gall bladder is that the tour of illness is longer than in an *ectomy* the morbidity is prone to be more positive and more prolonged than in *ectomy*. The recurrence of infection etc is positive in a fair percentage of all patients so operated.

**Postoperative Complications** — Persistent sinus is a relatively frequent occurrence and demands a second operation the dread of which has caused patients to suffer untold from months to years. During the first half of 1927 I operated on several of these sinuses and invariably found 1 or more stones the cause. In this series one carried her sinus sixteen years 1 large stone delivered with the *ectomy*. She had been operated at the age of seventeen. The second patient 1 large stone delivered with the *ectomy* carried his sinus six years. The third several small and 1 large stone sinus duration nine year. One male twelve

years secondary operation contracted gall bladder filled with millet seed sized calculi

The sinus in these patients is not discharging continually but intermittently the gall bladder fills with mucus (usually) or mucus and bile thereby producing distress etc the closed mouth of the sinus opens the contents discharge with relief to the patient and so on till surgery gives permanent relief

**Cholecystectomy**—Many of the foregoing arguments against the operation of cholecystostomy are the strong arguments for cholecystectomy as the elimination of the formation of sinuses resulting from incomplete operation *i.e.* leaving a stone. The use of non absorbable suture material in implanting the drain an operative sinus of commission instead of an incomplete operation. The leaving of an infected body the gall bladder producing or prolonging morbidity. The leaving of a useless shell that is subject to further or a new infection process. The leaving of a useless hell that may again produce stones any and all of these subjecting the patient not only to many disagreeable symptoms but likely to demand a second operation which owing to postoperative adhesions etc makes greater hazard in the second operation than a complete in the first would have been.

I am calling your attention to the fact that a few years ago reporting about 300 operations in a short period of time the mortality of ectomy was almost 1 per cent less than that of *ostomy*. Fearing that I had erred but not finding it so in going over my figures, I was pleased to note shortly that a large western and midwestern clinic in their report gave about the same mortality results. This very naturally was quite an incentive to continue the *ectomies* irrespective of other stable and strong arguments.

The period of convalescence in cholecystectomy is far less than that in cholecystostomy. This is an added argument when operating on the business man or woman or the laborer.

Nevertheless all being said for or against these operations I cannot refrain from making the statement that the occasional operator will or should have his best as to mortality results by

doing a cholecystostomy, and will therefore add that each operator should in the interest of his patient do that type of operation he is most conversant with and the one that will bring relief to his patient with the least mortality. Bear in mind that each cholecystectomy done is an operation that contains a potential risk of injury to the common or hepatic duct. Even may I quote (and not theoretically) that the hepatic artery, portal vein and vena cava have been injured in this operation, that the cystic artery has been injured or slipped out of the forceps grasp producing a great deal of troublesome hemorrhage before caught and controlled.

Either of the two operations under discussion has been accompanied with injuries to the duodenum stomach and transverse colon. Fortunately if recognized these injuries are far easier to control than those of injury to the ducts or blood vessels. Recognized injury to the common duct should be repaired immediately by one of the many efficient methods. It is the late evidences of injury to the ducts or secondary contraction that are difficult of repair and give a high morbidity.

Spillage of bile into the operating field is of no serious aspect nor is the spillage of pus or infected gall bladder contents. It is of course conceded that the field of operation has been well protected by gauze sponges and carefully wiped or sponged before the final closure.

Massive spillage of bile into the peritoneal cavity has been seen by me on several occasions four of which I can lay personal claim to during the first few postoperative days 3 recovering with proper drain introduced the fourth dying from a post operative pneumonia complicating the condition of a third day discovery of intraperitoneal bile.

A remarkable case of massive spillage of bile came under my observation on the fifteenth postoperative day in the wife of a physician. She was one of 3 cholecystectomies done in one afternoon by a surgeon in a neighboring town. The others made a proper recovery. This patient about 110 pounds in weight 5 feet 3 inches tall began her second day with some abdominal distress no temperature and slight acceleration of pulse

She had finished her fifteenth postoperative day and was in her home twenty four hours with the history that she had been treated for tympanitis for fully ten days past that her abdomen was distended equal to a full term pregnancy that she had also had a low median incision that was made to reach some tubo ovarian condition that the operating surgeon had opened the lower incision the morning of the day I saw her to what he took to be omentum and finding some bile stained fluid put in a catheter drainage tube. She presented the picture of a full time pregnancy patient. Pulse 110 respiration 30 fairly cheerful and complaining of difficulty in breathing and of gas in the abdomen. The lower wound contained a catheter the upper was healed. Percussion revealed dulness like that of ascites. *Diagnosis* Intraperitoneal bile. *Cause* Slipping of cystic duct ligature or non recognized injury to common duct.

I pushed my finger into the peritoneal cavity and removed over 10 pints of clear bile introducing the tube into the peritoneal cavity. In two days the patient was admitted to the Post Graduate Hospital and was observed for five or six days. The abdomen during this time having discharged through the tube a fair amount of bile for three days then began to distend in its upper portion.

Operation through the original gall bladder incision evacuated 80 ounces (5 pints) of bile that was measured besides the spill of over 8 to 10 ounces on the side. The subsequent convalescence was rapid bile ceased to flow in a couple of weeks. The patient gained in weight and then began to jaundice. *Diagnosis* Injury to the common duct. Repaired in six to eight weeks patient perfectly healthy quite a gain in weight.

I have gone rather into detail in this patient's experience to show the innocuousness of bile in the peritoneal cavity. I also refer you to an early contribution of mine some twenty to twenty five years ago on typhoid rupture of the gall bladder large amount of bile in the peritoneal cavity recovery etc.

These remarks about intraperitoneal bile call for the question of drain or not. For many years long before Richter's article on non drainage I was accustomed to sew up tight in those patients

whom I felt had no marked evidence of infection. It was in these patients that the 4 leakage cases occurred. Each time I had a leak I resorted to drainage until my non drain courage returned. I have now some years been sewing up tight all cases of even mild infections and draining only whom I find with a marked amount of edematous tissue in the gall bladder sulcus or patients with a very profound amount of pus in the field of operation.

The non drainage argument does not apply to invasions of the common duct nor those patients with pancreatitis. I am not inclined to the radical procedure or advice of Eisendrath of Chicago to open the common duct in all gall bladder patients but am rather guided by the condition of the common duct at the time of operation and the history preceding the operation. If there has been a positive jaundice history if the common duct is distended of course if stone or stones are palpable then I add a choledochostomy to the cholecystectomy.

Operations on the common and hepatic ducts irrespective of stone are done for stenosis such as follows occasional operations on the bladder for anastomoses when distal obstruction is due to malignancy. Operative relief may be easily performed in those obstructions below the cystic duct junction by doing a cholecystogastrostomy, a cholecystoduodenostomy or excision of the growth with end to end or plastic repair. If in the hepatic duct operative relief barring the introduction of a tube offers no future I have recently had 3 patients 1 male and 2 females with primary carcinoma of the hepatic duct.

Attention to common duct obstruction is called by the presence of jaundice. Jaundice of the many types seen will be considered only when due to stone stricture or malignancy. The jaundice of stone is readily diagnosticated by its intermittence and remittance. The jaundice of malignancy is slow, sure, non intermittent, not remittent and painless deepening from lemon to mahogany color.

Before operating on a patient with jaundice of over three to four days duration I invariably demand a complete blood picture and a coagulation time by the capillary method. Should the coagulation time be over seven minutes I do not risk the

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# CLINIC OF DR. HOWARD LIEBNTHAL

PRIVATE PAVILION Mt SINAI HOSPITAL

## TUBERCULOSIS OF THE LUNGS APICOLYSIS BY TWO DIFFERENT METHODS

THERE are presented here 2 cases of tuberculosis of the lungs in which apicolysis was necessary as a part of the surgical treatment. The methods employed in each case are very different and a comparison should be found instructive.

### CASE I

The patient Mrs. B. upon whom we are to operate today is about thirty years of age. She was referred to me by Drs. Charles L. Minor and Paul H. Ringer of Asheville N. C. and I first saw her less than two months ago. She has been suffering from severe tuberculosis of the left lung for about five years with the usual physical signs and other features of the clinical picture of this disease.

About a year before I saw her she had been operated upon by another surgeon who had performed paravertebral thoracoplasty resecting eleven ribs in two stages. He had also avulsed the left phrenic nerve through a small transverse incision about  $2\frac{1}{2}$  inches above the clavicle the insignificant scar of which you may see.

The collapse as you will note from the x-ray film, which is fastened to the window before you by adhesive strips is not quite as complete as might be expected with so extensive a resection. The cause of this is impossible to state but it happens in a certain number of cases through no fault in technic. There is good elevation of the diaphragm but it is not easy perhaps impossible to judge of this by the roentgenogram because no gastric bubble is present. Usually I make sure that such a bubble

should be visible by having the patient take a glass of carbonated water just before the picture is taken. He is requested not to eructate the gas as it is set free in the stomach and in the erect posture a sufficient bubble is formed to make out the upper limits of the diaphragm. This method is feasible only in the left sided cases.



Fig 94—S. f. m. fr. t. C. mplete p. t. b. l. th. opl. sty. h. be. pe. fo. m. d. b. t. th. m. u. ll. p. d. ca. ty. t. th. l. fr. pe. N. te. p. ty. f. l. t. ch. t. d. t. m. p. d. d. e. f. the. l. g. w. th. th. c. k. e. g. of. the. pl. a. (See Fig 95.)

The important feature of the picture which you see is a pear shaped cavity the small end running up behind the clavicle the cavity being about as large as a good sized plum.

This patient is in excellent general condition. She seldom

Th. p. l. g. to. p. w. a. d. t. r. y. w. ll. b. g. h. t. o. t. th. e. p. d. c. t. b. t. t. h. m. p. a. t. f. t. h. c. a. v. t. y. e. a. l. y. s. e.

has elevations of temperature and has been able to take such exercise as walking slowly for short periods of time. Her principal complaint has been cough and profuse bacillary expectoration the amount discharged being about 4 or 5 ounces daily. The danger of this to the opposite lung, which thus far has been



Fig 95.—Same patient as in Fig 94 but seen from behind so position of lungs is the reverse of Fig 94. The Bucky diaphragm was used in making this picture so that the soft parts are penetrated by the x ray and the bones stand out in relief. A useful method after thoracoplasty.

but slightly affected is considerable. During the course of her illness there has been a pyothorax which disappeared without open operation.

While it is not possible to demonstrate that all this expectoration comes from the cavity, it was the opinion of Dr

The attitude of the patient as she lies upon the table is such as to bring the part to be operated upon almost uppermost and she is held in this position by cushions placed beneath her left shoulder and back.

We are using pure tincture of iodin for the skin. After two or three minutes time this iodin is partly washed away with 95 per cent alcohol so that a burn may not result. The iodin however has penetrated into the deeper parts of the skin and has sufficiently sterilized the structure. I also dip my finger tips in tincture of iodin and permit it to dry before scrubbing. The nail and periungual space are thus sterilized.

The draping having been applied we begin by drawing the left breast toward the midline of the body and having the patient's arm raised above her head where an assistant supports it. It is our intention to resect a piece of the second rib and our incision is along the fold of the external part of the breast beginning high in the anterior axillary line. Hemostasis is carefully secured and you now see that the edge of the great pectoral muscle is exposed. In order to gain plenty of room anteriorly without dividing any part of this muscle the patient's arm is now lowered so that the elbow is again at her body. This as you see nicely relaxes the muscle and with the aid of a blunt retractor it can be drawn well away from the line of incision toward the median line.

As the second rib is exposed you see that it runs in a direction much nearer the long axis of the body than would have been the case had no thoracoplasty been performed. In fact in all operations in this region after thoracoplasty the landmarks are considerably changed and it may be extremely difficult or even impossible to tell exactly which rib is being exposed. In this instance however I can feel the first rib in its relation to the clavicle. Very carefully the periosteum is stripped from the rib and about 1-<sup>1</sup>/<sub>2</sub> inch of the bone is cut smoothly away with Shoemaker's rib shears. It is of course most important that the parietal pleura be not violated in this part of the operative procedure.

Now with the volar surface of the finger toward the center

of the body and its back closely hugging the next rib above all the structures beneath the ribs are slowly and carefully peeled away from the periosteum of the ribs themselves. When more than one rib has been cut naturally the periosteum is pushed away from each rib which has been divided. Here however with only one costectomy the endothoracic fascia and the parietal pleura are the principal structures which are under the palmar surface of the dissecting finger.

I had hoped to be able to surmount the apex of the lung extrapleurally and to push the cavity directly downward toward the base of the chest. I find adhesions here however so dense that I fear either entrance into the pleura or injury to some important vascular structure and therefore although my finger as you see is surely at the level of the clavicle I dare not push it toward the median line sufficiently to get to the actual top of the chest. I shall therefore have to content myself with making a space fully the size of the pathologic pulmonary cavity and then filling this space with fat from the patient's abdomen.

I have now gradually enlarged this cavity and I fill it temporarily with a strip of gauze packing. Removing this packing and forming it into a ball I can estimate the capacity of the newly made space. We have made room for a piece of fat which will probably be considerably larger than the tuberculous pulmonary cavity.

Covering the axillary wound with a piece of gauze we now expose the patient's abdomen and disinfect it by the iodin method. A long incision is made beginning at the level of the umbilicus on the left side curving downward and across the median line to the corresponding place above on the right side. The skin is quickly dissected away from the adipose layer as far as the umbilicus and the entire fat is removed down to the aponeurosis in one piece using an extremely sharp knife and taking care not to maul or contuse the fat. We now have a transplant which certainly is larger than the estimated size of the original pulmonary cavity and exposing the wound in the axilla we crowd this tissue into the artificially made space through the opening left by the rib resection.

Please note that the periosteum of the resected rib as well as pleura and endothoracic fascia is pushed ahead of this fat. The periosteum of the rib above not having been stripped off can obviously not be used so that part of the depression is lined by pleura and fascia alone.

I find that I have succeeded in making a space larger than I thought and therefore we will return to the abdominal incision and take away as much as we can of the suprapubic fat from the lower edge of the abdominal wound. This we remove in a long strip about the size of an ordinary Frankfurter sausage and crowd it into the thoracic space on top of the first implant. It is necessary to hold this fat in place and I do this by making a grill of chromicized catgut placed in suture fashion but without drawing the parts together. In fact I have always found it impossible actually to approximate the soft parts of the chest wall after ribs have been resected in this manner. We have made a cage however of this chromicized catgut which effectively holds the fat within. The retaining sutures must be passed through the tougher parts of the chest wall and I use even the costal periosteum for this purpose.

The wound is now being closed with metal clips and without drainage. A large pad of crumpled gauze is placed over all held firmly in position with elastic adhesive strips (elastikon). While I have been closing this wound my assistant Dr E E Arnheim has been suturing the abdominal wound and also adapting its edges more accurately with metal clips. This wound also has been closed without drainage.

The operation is now finished and the patient is coming out of her anesthesia. You see that she is coughing and that a little blood tinges the mucus that is expectorated. This is quite natural since the walls of the cavity have been rather strongly manipulated. The patient's condition is excellent. She has lost very little blood and if the deities who watch over transplanted tissues are kind to us we shall succeed in obliterating a good part of the diseased secreting cavity.

It has been said that fat implanted thus does not remain as fat. Be this as it may from my own observations I know that

if it is not fat it has certainly become something very much resembling this tissue and it is not absorbed thereby, being far preferable to muscle flap (whether pedunculated or not), a tissue which does become fibrous or atrophic with disuse

Postoperative Note (three weeks later) —A little fluid gathered within the space left in the abdominal wall but there was no infection. After it was aspirated twice through a hypodermic needle there was no further discharge, and the wound healed perfectly. A little edema over the part of the pectoral muscle which had been retracted was seen two days after the operation but this disappeared promptly and there was an absolutely perfect healing. There was a reaction temperature of  $102.5^{\circ}\text{F}$ , due probably to tuberculinization which was caused by the entrance of toxins into the blood and lymph spaces at the time of manipulation. This subsided rapidly. There was an immediate reduction in the cough and when the patient left the hospital December 21 1927 only three weeks after her operation the total expectoration was less than 25 c.c. in twenty four hours. The cough had almost disappeared and her general condition was even better than when she entered the hospital. The x-ray pictures show that we did not completely obliterate the cavity but converted it into a narrow slit which we may hope will gradually disappear

#### CASE II

November 28 1927 —This man G. R. M. a veteran of the World War aged twenty five is about to undergo his sixth and I sincerely trust his last operation for the arrest or cure of a tuberculosis of the left lung. He was referred to me by Dr. Joseph L. Sproull of Jamestown N. C. late in November 1926. He had been under treatment for about two years but his illness was known to have been present two years before that, and probably dates back much farther. Extensive adhesions following a left sided pleurisy had balked well planned efforts to produce compression by artificial pneumothorax.

When I saw him first his general condition was excellent and his temperature almost normal. There was however distressing cough with positive sputum of about 4 ounces a day the

greater portion of which was expectorated at one time in the morning. The physical signs were those of an enormous cavity in the left upper lobe but a few rales some of them musical were found in the right chest as well. I have brought some of his x-ray pictures to the operating room and you will see them here displayed. These pictures show a rather general distribution of disease in the opposite lung, but Dr. Sproull does not

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Fig 99.—Enormous cavity in left upper lobe. It looks almost like a healthy lung. It appears healthy.

believe that this is active and at present the lung appears healthy.

In all these cases it is absolutely essential that a sputum be made for at least two months before planning any operative procedure. The presence of non progressive changes in the contralateral lung does not indicate an operation unless they are very extensive while the

in *itv* especially at the base would contraindicate a major operation upon the chest

We see here the enormous left sided upper lobe cavity to which I have referred but the lower part of the same lung looks nearly normal so that you may well understand how anxious I was to preserve its function if possible



Fig 100.—Same patient as in Fig 99 but following paravertebral thoracoplasty of eight ribs. The huge apical pulmonary cavity is not sufficiently collapsed

On December 1 1926 I resected the first four ribs using local anesthesia. My favorite method for this differs from the usual one because much less of the anesthetic solution novocain and adrenalin is used than is ordinarily taught. I infiltrate

only the parts upon which I am operating and do not diffuse the anesthetic solution throughout a great area. When I come to ribs the nerves just above and below each one are obtunded by injecting as nearly as possible into their trunks a few drops of 1 per cent novocain with about 1:10,000 adrenalin. In order to make the work upon a rib painless not only the rib but the intercostal nerve of the one above and the superior branch of the one below must be infiltrated as well.



Fig. 101.—Same patient after modified apical and craniated costosternal flap. Comp. with Fig. 99.

In this instance I made the customary incision almost parallel with the spine and about  $1\frac{1}{2}$  inches away as far down as the sixth rib. The second rib was first resected about 2 inches being removed by posterior section beginning well behind the angle of the rib—almost as far as the lateral process of the corresponding vertebra. These resections are done subperiosteally and I consider this of great importance because if the periosteum is removed together with the ribs lack of union is apt to follow. It

is the union of these ribs not end to end but in a fused mass of bone from the upper to the lower rib which produces rigidity of the chest wall. This is almost as important as the reduction of the size of the hemithorax in bringing about the conditions of respiratory rest necessary for the cure of tuberculosis.

In the postoperative pictures you will note this bridge of bone which is even denser than the normal ribs.

Having resected the second rib the third next received attention and about 3 inches were removed. I have found that the best instrument for cutting all the ribs except the first is the rib shears of Shoemaker a Dutch surgeon. When we come to the first rib however these rib shears cannot be made to function properly and the resection must be made with some other kind of bone forceps or rongeur. I have devised a heavy guillotine for this express purpose and it has given me the greatest satisfaction. It was made after my design by Niemann of New York.

While it is extremely important to divide the first rib it is not usually necessary to remove more than  $\frac{3}{4}$  to 1 inch of this bone the object being to prevent a too rapid union. All the ribs are connected with each other by muscular and fibrous tissue and if the first rib is not cut there is a strong tendency to prevent the effective dropping of those immediately beneath it. This is one reason why I begin my thoracoplasties at the top of the chest instead of at the bottom as has been advised by some surgeons.

At this first stage I resected four ribs and placed a silk ligature around the fifth rib leaving it buried in the wound so as to act as a landmark at the next stage of the operation thus saving several minutes of time and avoiding the necessity of disturbing the healing portion of the wound. The incision was closed with interrupted stitches of chromicized catgut which passed through the muscles and fascia with several silkworm gut sutures for the skin supplemented by metal clips.

I pay particular attention always to hemostasis in these operations and to avoid the gathering of postoperative serum. I have usually avoided the use of drains.

which have been resected on former occasions I believe it may be worth considering I have brought with me therefore an ordinary leather punch to perforate the ribs for a thick kangaroo tendon suture I tried to get a punch which is made for the purpose (Friedrich's rib perforator) but none was to be had in New York So I tested this leather punch on a piece of beef rib and found that it worked well We shall see what the action may be on these ribs which are probably more fragile than normal on account of long disuse Dr Branower is again officiating with ethylene

The operation as you see is a simple one We make an incision about 6 inches in length between the ninth and tenth ribs first exposing the ninth Clearing the periosteum I note that this rib has become fused with the eighth by a bony bridge Temporarily abandoning the ninth rib I expose the tenth through the same incision and easily remove about 5 inches of this bone



Fig 102—Matson rib stripper

making the posterior section close to the spine In freeing the upper and lower edges of the rib of their periosteum in thoracoplasty I have been using the ingenious and effective rib stripper devised by Dr Ralph Matson of Portland Oregon As you observe this instrument is very easy to use and is less liable to injure the pleura than any other stripper I have seen

Because of the direction of the fibers which unite the intercostal muscle to the edges of the ribs it has been found that stripping forward along the upper edge of the rib and backward on the lower edge gives the best results The face of the rib is of course cleared of periosteum in the usual way with a bone scraper and by wiping with gauze Then the Matson stripper is employed Lastly the ribs are divided with the Shoemaker shears

Having resected the tenth and about 2 inches of the eleventh rib we turn our attention again to the ninth which is frozen to the eighth. I used to be number one man on my class tug of war team at Harvard and am supposed still to have a pretty good grip but even with this large hemichestomy forceps I find myself unable to divide this tough resistant bony bridge. Therefore I will use a mallet and chisel. This works nicely the rib is now free and I resect about 3 inches of it with the shears in the usual manner.

Applying the punch I find it perfectly possible to perforate these ribs but unfortunately they are of a different consistency from the beef ribs and have a tendency to splinter. However I have succeeded in perforating the ninth rib posteriorly the tenth anteriorly and am able to pass the kangaroo tendon suture so as to approximate the two bones and these carry with them the other now mobile anterior segments of the divided ribs.

A few chromicized catgut sutures are put into the muscle planes and the skin is closed with metal clips a small oft drainage tube lying in the depths emerging from the interior end of the wound to be removed in forty eight hours.

**Postoperative Note—January 9 1928**—While the wound healed nicely and there was considerable improvement the quantity of expectoration was greater than I thought it should be at this stage about 2 ounces in twenty four hours much of which to be sure was salivary in character. With the collapse of the chest following the procedure of December 1 1927 the thoracic wall immediately above this last collapse appeared unduly prominent and I concluded that further resection should be performed. I did this three days ago making my incision through the scar of the old thoracoplasty.

Portions of three ribs were excised. This diminished the sharp difference between full collapse below and incomplete collapse of the adjoining chest wall above. Although this operation was technically difficult on account of the many costal abnormalities which were now present the result seems to have been all that could have been desired the patient scarcely coughing or expectorating at all.

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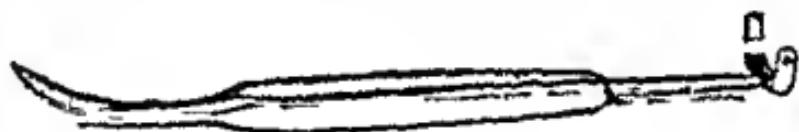


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## CLINIC OF DR J J MOORHEAD

NEW YORK POST GRADUATE HOSPITAL

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### ARTHROTOMY FOR KNEE JOINT ARTHRITIS

In a previous article<sup>1</sup> 49 cases of arthrotomy of the knee were made the basis of a discussion revolving around the diagnosis and operative relief of knee joint calculi. That series attempted to show that the term calculus (used instead of joint mice rice bodies loose bodies internal derangement) was justified by analogy because so many arthroliths acted like calculi elsewhere (renal or biliary) and that the surgical knee from a diagnostic symptomatic and therapeutic standpoint greatly resembled the surgical abdomen.

There are three main sources of knee joint dysfunction namely trauma infection and disease and each of these may act independently or concertedly. For example a traumatic synovitis may by metastasis from a distant focus become an arthro synovitis or an infective synovitis relatively quiescent may be come activated by trauma. Hence there is an interrelationship from an etiologic standpoint quite as much as from a symptomatic and therapeutic standpoint.

Multiple arthritis or polyarthritis may occur from many sources some of which are easily differentiated others wholly a matter of surmise or suspicion. There can be no question that arthritis (poly or mono) often can be traced to foci of infection in the oral nasopharyngeal gastro intestinal or genito urinary tracts. Other sources of origin all of them microbial almost without number have been accused and perhaps even convicted but the clinical fact remains that in a considerable number no definite focus can be located no definite origin determined.

We have all had the experience of vainly advising patients

to undergo teeth extraction tonsil removal laparotomy sinus operation Our end results have too often been more mutilative than reparative As a matter of common honesty we must admit that in a number of cases we cannot discover the focus nor can we much better the manifestations The remedies advised are legion witness the great collection of arthrodynes the sera the vaccines the biochemicals the physiotherapeutics

After a time the process registers in the joint to such an extent that it becomes unstable deformed irregular and from then on a mechanical factor is introduced which of itself is capable of reproducing enough intra articular irritation to keep that joint actively symptomatic A vicious circle is now established for the original synovitis has by progression become hypertrophic osteo arthritis with definite changes in and about the articulation From a minor arthritis the transition has produced a deforming osteitis often of a crippling character

A number of these arthropathies affect the knee joint and because of the necessary weight bearing demands it becomes a serious matter if the stage of bone distortion is reached for now we have the combined effect of an infective process and a mechanical derangement

The inside of the knee joint is a cylinder lined by a multi chambered smooth membrane (synovia) in which a rocker arm (femur and tibia) moves through an area roughly half a circle each hinged end of the rocker being covered by cartilage and limited in motion by definite guy rods (crucial and capsular ligaments) This cylinder is lubricated by a fluid derived from its own lining and this fluid also acts as a nutritive media for the cartilage covering the ends of the smaller rocker arm (semi lunars)

If we thus visualize the knee joint as a mechanical entity it needs no argument to prove that distortion of this cylinder can be brought about by essential derangement of any of these intrinsic components There is a certain amount of compensatory power in this joint but if the cartilage element is affected instability insecurity inactivity result Cartilage everywhere is poor in smooth reparative power witness the boxer's ear the

nasal septum the interarticular cartilage of the spine fingers and wrist

Hypertrophic changes in the synovia or the bone likewise produce irregularity and often enough striae become apparent clinically or radiographically. It is not improbable that recurrent or chronic synovitis may be of itself an infective focus irrespective of the mechanical irritation incident to its own irregularity fringes folds adhesions calcified tips. We have seen knobs of synovia in the joint resembling adenoids again it has been covered in areas by an adherent membrane which bled like a diphtheritic patch again it has peeled off like fibrin flakes in the abdomen. Recently we saw it pigmented by blood so that it resembled daubs made by a paint brush.

If in a mono arthritis of the knee disturbance of these intrinsic structures leads to (1) pain (2) instability (3) limitation (4) atrophy (5) crepitation it is our belief that arthrotomy is indicated not only to relieve the residual mechanical derangement but possibly also to remove foci of infection within the joint as from hypertrophied synovia.

It will not avail much to resort to drugs sera vaccines, physiotherapy (radiant heat electricity hydrotherapy) or external supports (strapping pads braces) in this large group in which symptoms arise from or are activated by mechanical derangements. Such palliatives are as futile as if employed for calculi in the biliary or kidney tract. We can of course relieve the crises the colics (abdominal or articular) by appropriate palliatives but to attain cure the foreign bodies must be removed effectively.

The recognition that gall bladder disease is just as symptom producing without stones as with stones may well be applied to the knee joint. Too often we are reluctant to perform arthrotomy because definite calculi cannot be shown clinically or radiographically forgetting that as in the gall bladder, only a small proportion of arthroliths are thus determinable. Cartilage and synovia will not show unless calcified, and this despite injecting the joint with air or lipiodol or seeking to view it with the arthroscope.

Pain recurrent synovitis insecurity limitation atrophy crepitation all are symptoms of intra articular mischief all signs of joint indigestion If after reasonable attempts to remedy them they still recur marked as they often will be by definite crises (severe pain massive synovitis joint locking) the time has arrived in selected cases to attempt relief by arthrotomy

#### TECHNIC OF ARTHROTOMY

The exposure should be adequate and hence the patella splitting incision popularized by Sir Robert Jones may be used

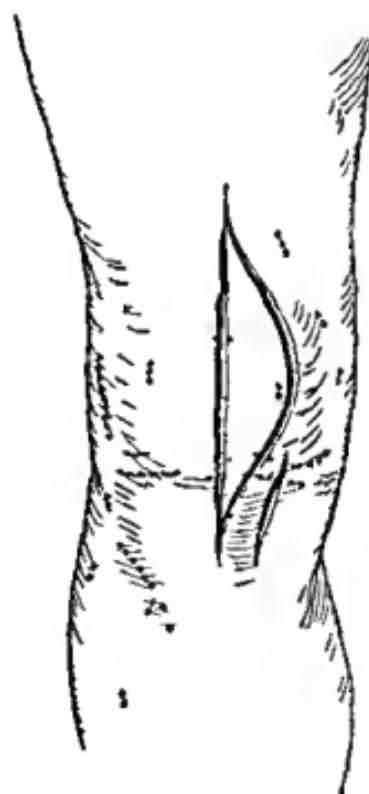


Fig 103.—Incision for median transverse medial and lateral arthrotomy and lateral arthrotomy

We have however since abandoned this procedure in favor of the mediolateral incision indicated in Fig 103. This gives just as adequate approach and does not require section of the bone

We have practically abandoned (except in recent or typical cases) the small incision formerly recommended and used for removal of a semilunar or isolated arthrolith. It is our experience that wide exposure is the safest because most unexpectedly lesions are found distant from the zone explored. Here again we revert to experience in abdominal surgery and the prudent surgeon no longer makes a small incision but in every sense per-



Fig. 104.—Mediolateral arthrotomy skin incision

forms an exploratory laparotomy. The expected appendicitis proves to be duodenal ulcer, the expected hypertrophic synovitis proves to be calcified subpatellar fat pads.

We have performed 91 arthrotomies of the knee in the period February 9, 1919–January 4, 1928, of these 12 were through the small incision, 23 through the transpatellar incision, 56 through the mediolateral incision to be described.

In all we have employed the ultra aseptic hands off or Lane technic and nurse assistants and operator do not touch the wound or anything coming into contact with it. Each instrument after being used once is tossed into an electric sterilizer or into a basin of steaming water and this is changed every ten minutes throughout the operation.

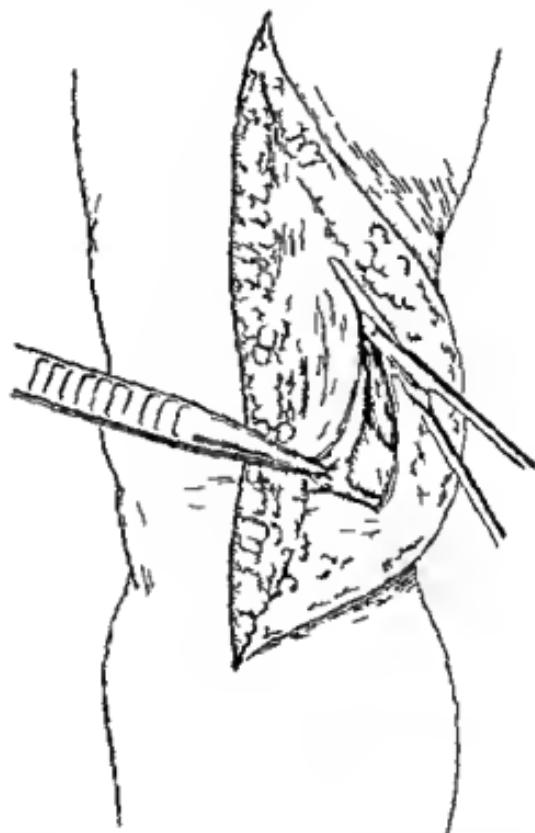


Fig 105 — Capsule being sutured along edge of skin incision.

A tourniquet is used and not released until the dressings are in place.

A Reverdin needle facilitates passing the sutures. We rarely tie vessels relying instead on accurate suturing of the various layers.

We do not hang the knee over the end of the table to permit exploration in the flexed position. Instead we place a sand bag on the outer side of the opposite knee and bend the explored knee

to a right angle and place the sole against the inside of the opposite thigh the sand bag preventing that limb from moving. This gives a very satisfactory view and does not disturb the drapings.

Steps—(1) Incision down to fascia beginning 3 inches above the top of the middle of the patella. This passes downward to a finger's breadth above the top of the patella and thence around

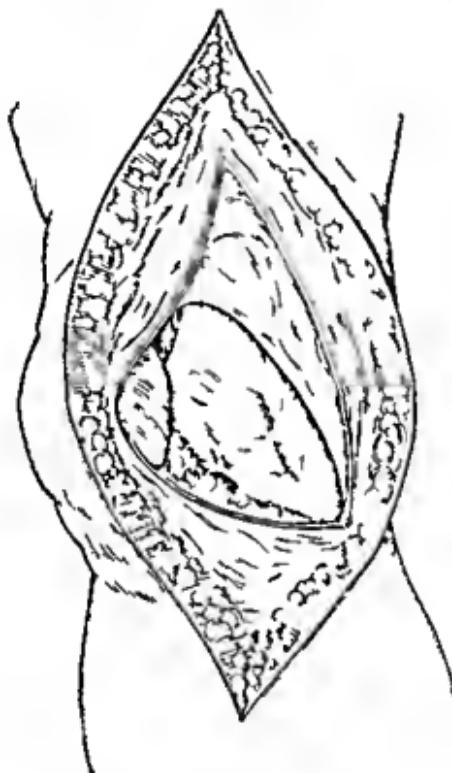


Fig. 106—Patella retracted showing anterolateral portion of joint

the inner side of same (a finger's breadth from its margin) ending at the tibial tubercle (Fig. 104).

- (2) Skin edges now protected by gauze or towels
- (3) Sulcus of *vastus internus* and capsule recognized and separated at upper inner angle of incision avoid cutting the muscle if possible
- (4) Pick up the capsule about opposite the middle of the patella and cut it between forceps as in laparotomy. This opens the joint

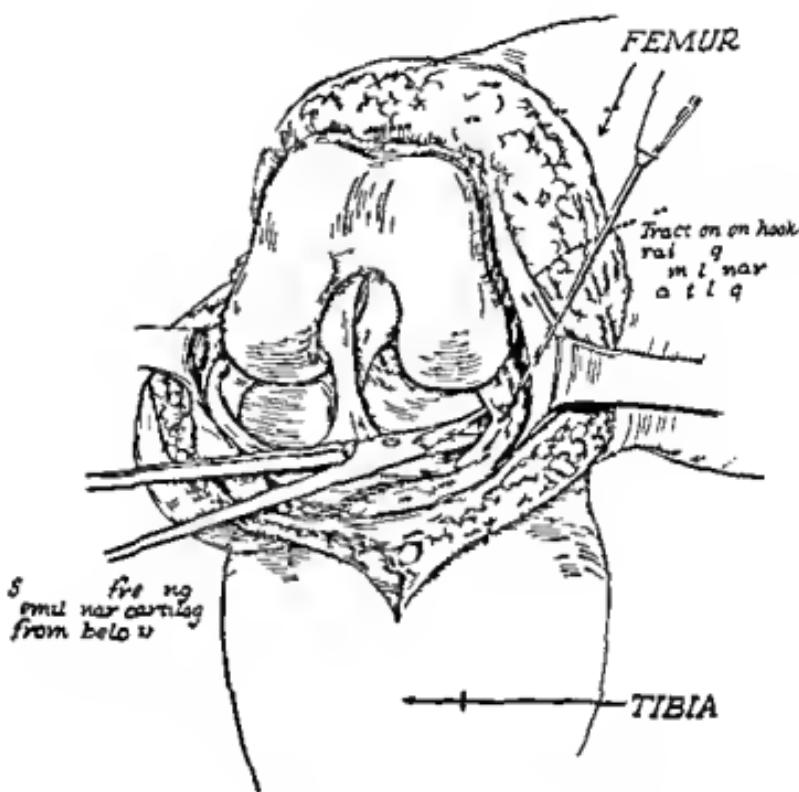


Fig. 107.—Lateral approach to the knee joint. The femur is on the left and the tibia on the right. A vertical line of resection is shown on the femur, with a label "Tract on on hook rail in lateral art lg". A label "s emil nar cartlg from below" points to a depression in the femur. A horizontal line of resection is shown on the tibia, with a label "TIBIA".

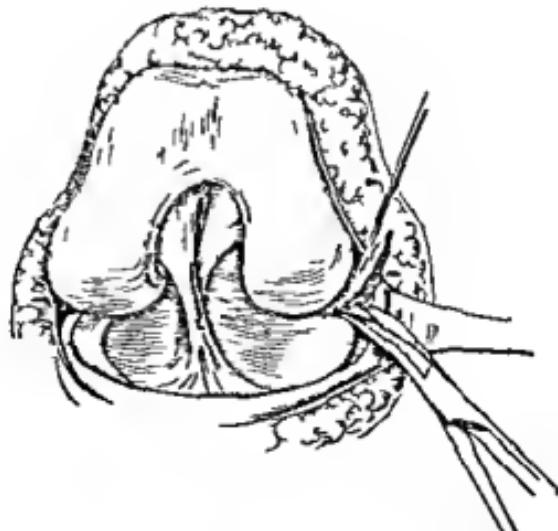


Fig. 108.—Medial approach to the knee joint. The femur is on the left and the tibia on the right. A vertical line of resection is shown on the femur, with a label "Tract on on hook rail in medial art lg". A horizontal line of resection is shown on the tibia, with a label "TIBIA".

- (5) Extend the capsule incision in the line of the skin incision until both are of the same length
- (6) Explore the lateral compartments of the joint and excise fringes adhesions or other lesions
- (7) Retract the patella outward flex the joint and examine the subpatellar fat pads the tibial spine region and both semi-lunar cartilages

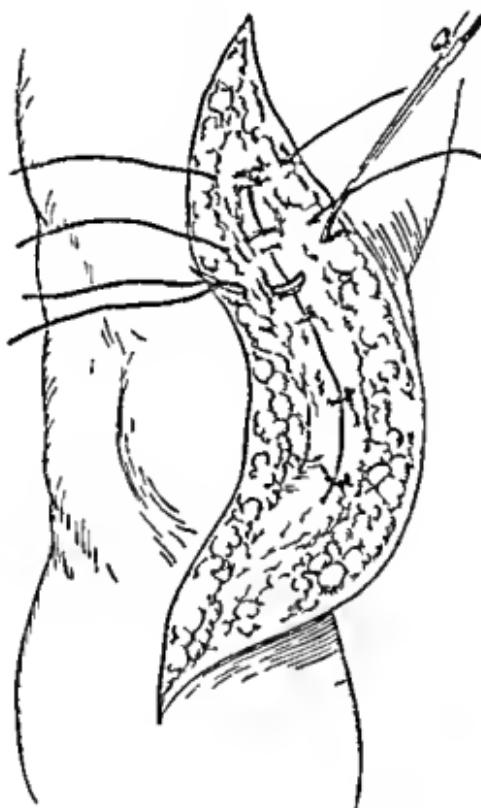


Fig 109.—Capsule sutured. Deep fascia and part of vastus internus being sutured

- (8) Suture the capsule with plain catgut interrupted or continuous stitch
- (9) Suture the fascia and muscle likewise in one layer
- (10) Suture the superficial fascia with plain catgut interrupted stitches if redundant or fatty
- (11) Suture the skin with interrupted stitches of silkworm gut or silk

(12) Large dressing gauze and cotton so bandaged as not to prevent subsequent mobilization. No splint or plaster of Paris is used

(13) Remove tourniquet

Postoperative Care — When out of the anesthetic insist on motion of the joint every two hours for the first two days. This is to be done by the patient aided perhaps by a pillow pushed gradually under the knee or perhaps aided by a sling fastened to the knee and an overhead frame

On the third to the fifth day the patient is made to bend the knee over the edge of the bed a pair of reins being fastened to the foot and given to the patient so that control of the limb is literally in the hands of the patient. After the fifth day the patient is out of bed and usually walks on the seventh day. We do not advise crutches

Timid patients are told to push a wheel chair or use the invalid walker (a glorified child's creeper) or fasten the foot reins around the neck.

From the outset the patient is urged to frequently contract the quadriceps and thus is taught to shrug the patella and lift the extended limb off the bed by pulling on the opposite bent knee

Stitches are removed in seven to ten days and adhesive straps are criss crossed over the wound

The joint usually remains swollen for several weeks but effusion will be more quickly absorbed if hot soaks of soapuds are used followed by massage with camphorated oil and finally exposure to the rays from a 50 watt Mazda unfrosted electric light bulb. This soak oil rub and electric light exposure takes ten minutes or longer for each item once or twice daily

We urge the patient from the outset to use the joint just to the point of producing lasting pain accompanied by local heat short of this no harm will ensue. It is especially necessary to begin self motion in the first two postoperative days otherwise joint stiffness precludes early return of function

## FRACTURE OF HEAD OF RADIUS—COMMINUTED

*Diagnosis* Fracture of head of radius—communited

*Duration* Five weeks

*Age* Thirty two

*Causation* Thrown off a truck

*Previous treatment* Posterior plint massage and baking

*Examination* Flexion of the elbow to right angle is possible extension to 165 degrees but not beyond pronation and supination are limited by half no damage to the neural or vascular supply

*Comment*—The question now arises as to what to do The x ray lateral view shows what appears to be a fragment of bone about half the size of a chestnut lying in front of the joint One end of this fragment is rounded and has the general appearance of the head of the radius I always think of the head of the radius as resembling the top of an old fashioned wooden clothespin We are dealing here essentially with a foreign body which blocks the joint We are dealing also with a contracture of soft parts unquestionably there has been a tear of the orbicular ligament and there has also been an arthrosynovitis which is one of the invariable complications and associates of a joint fracture I do not think the patient can be further benefited by continuing massage and baking He has consented to be operated upon

The danger of the operation is the damage that may be done to the posterior interosseous nerve which is the motor continuation of the musculospiral nerve Prior to the operation he has had the elbow wrapped in a wet dressing of a dram of tincture of iodin to a pint of saline solution which is our routine over night preoperative skin preparation

*Operation*—The arm and forearm rest on a board at the side of the table and the forearm itself is placed palm downward on this board

An incision 3 inches long is made starting 1 inch above the

external condyle directly down upon the end of the radius which can be seen and felt to rotate. The skin edges are now protected by towels. The fascia and the muscle beneath are lightly incised and a retractor is placed in such a position that a finger can be introduced into the wound and this locates the broken off head of the radius for us.

The incision through the fascia and muscle is now extended and an Ollier bone elevator denudes the bone. This is a most useful instrument because it has two sides and one end sharpened thus acting far better than the ordinary elevator. I now insert a finger and locate a bony fragment in front of the joint. This I dislodge with a curet and when it is extracted find that it is approximately  $\frac{1}{2}$  by  $\frac{1}{2}$  inch in outline and consists of about half the diameter of the head of the radius. When we place it against the x-ray film the outlines correspond.

We insert a piece of gauze into the wound so that small fragments of bone may be caught in its meshes and we are quite careful to stop all bleeding. No stitches are placed in the muscle or fascia. The skin is sutured by interrupted stitches of cotton thread. No splintage is necessary because in effect we have removed only a foreign body and would not splint an elbow from which a shrapnel fragment or a bullet had been removed. A wet dressing of iodin saline solution (1 dram tincture of iodin to 1 pint saline solution) is applied and this is covered by cotton and a bandage. We will encourage the patient to move his elbow as much as possible especially for the purpose of pronation and supination.

Remarks — The early treatment of fracture of the head of the radius depends upon whether or not the fragments are separated. If they are not a posterior splint is applied with the joint at a right angle and in supination. Massage can be given from the outset and motion can be started in about ten days. Most of the injuries about the elbow joint not excluding severe sprains cause a tearing of the capsule the inner layer of which proliferates and has a tendency to produce a pseudomysitis ossificans. This is well shown in supracondylar fractures of the humerus and in epiphyseal separation of the lower end of the humerus.

This pseudo bony mass oftentimes bridges over the hollow of the front of the elbow. It should not be interfered with early because in effect it is like a keloid and if we interfere with it we are likely to provoke a recurrence. If left alone it usually subsides or at least smooths off.

In fractures of the head of the radius with displacement it is rarely possible by the closed method to realign the smaller with the larger fragment hence open operation is demanded. Occasionally we can replace the head of the bone and retain it by a suture a bone or metal pin a thin needle or occasionally by wire. However in the majority of cases removal of the fragment is necessary. The end result is usually satisfactory. The deficiency in function usually manifests itself as regards pronation and supination. The earlier the operation is performed the better.

Diagnosis in the non separated cases (we call these Type II) is made by noting local tenderness limited pronation and supination especially by eliciting definite pain below the external condyle when twisting the forearm. In any bone injury have great respect for local pain on pressure or motion. Localization of this sort is almost as diagnostic in fracture as it is in appendicitis. In the separated cases (we call these Type I) the diagnosis is made by noting bony deformity crepitus false motion and dysfunction. Often the fragment can be palpated in the bend of the elbow.

In passing let us not forget that, in a fracture of the shaft of the ulna there is often a coincident dislocation of the head of the radius. This parallels the association of a fracture of the lower end of the tibia and the upper end of the fibula.



## PHYSIOTHERAPY AFTER INJURY

THERE has always been a great deal of controversy as to the best method of overcoming some of the common complications of such usual injuries as sprains synovitis dislocations infected wounds and fractures Supply houses and others are constantly seeking to have us obtain costly pieces of apparatus We are also offered various forms of external appliances and applications all of which are presented with the zeal of propaganda

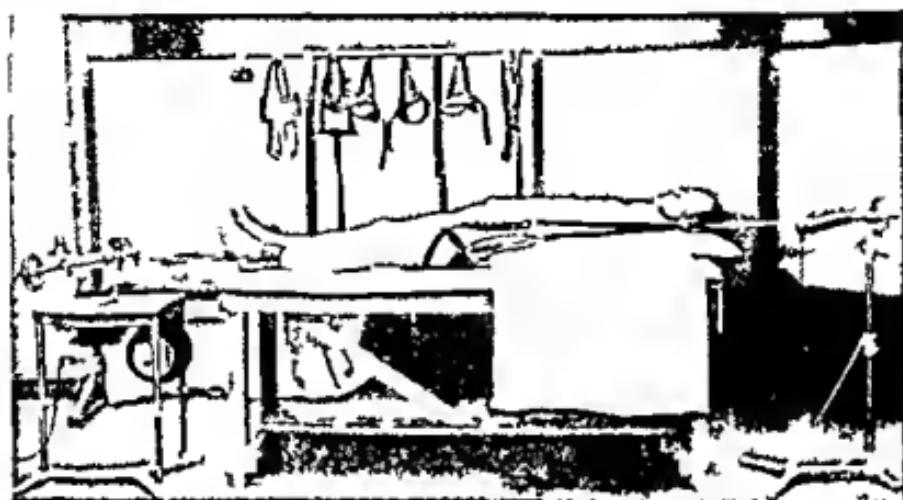
In the experience of the writer the most beneficial form of physiotherapy is massage with regulated prescribed motions Next in value is external heat applied in the form of baking or moist heat as it is obtainable by the whirlpool bath

Experience with diathermy has not been very helpful Galvanism and faradism have a limited place We have also found useful a certain form of muscle exercise activated by an electric motor The field of usefulness of this type of apparatus will be increased now that a portable form has been placed upon the market

Recently we have been trying out with success an apparatus for use in stiff joints This is activated by a  $\frac{1}{2}$  horsepower motor which moves an arc through an area up to 7 inches and is then followed by a period of relaxation A harness is fastened to the extremity at either end so that a pull and counter pull is possible It is adapted for use on any joint and harness is supplied which permits activation to be given to fingers and toes spine hips knees and all other joints

Quite recently the writer has taken advantage of this pull and let go power to use the machine in the setting of fractures The initial experience has been quite satisfactory and at a later date it will be possible in conjunction with the fluoroscope and anesthesia to set a fracture automatically It will be quite easy to do this for recent fractures but there is no reason why the regulated pull of the strong levers of this machine cannot also set a fracture after a lapse of several days

Physiotherapy has a place in the treatment of the injured which should not be regarded as an after treatment but which on the contrary should be looked upon as a coincident treatment. It is important to remember that immobilization especially



F 110—Th m t tt ch d t th t ct t p f fact f  
th l g d d t l t p h w h g g th Th m f th  
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after joint injuries leads to troublesome adhesions and under such circumstances it may take longer for the patient to recover from treatment than it took to recover from the injury.

## PLASTER BLOCK SPLINTS

PLASTER OF PARIS two piece molded splints are widely used and to a considerable extent have replaced circular casings or casts. There is no question as to the safety and general value of molded splints and their use would be more universal if plaster of Paris could be marketed in forms or blocks instead of rolled bandages.

These last unless freshly made are usually poor in setting quality they crack or crumble and they mess up the orderly cleanliness of the sick room office or hospital.

In the building industry shaped plaster blocks have largely replaced plaster applied by the trowel and the process thus gains in efficiency and speed.

Recognizing fully the demerits of the existing methods of using plaster of Paris an attempt has been made to simplify and speed up the process by providing a plaster splint ready to apply after soaking it in water. Experiments made for me by the firm of Johnson & Johnson demonstrate that selected gypsum (calcium sulphate) makes a plaster of Paris requiring less soaking lighter in weight less crumbling less likely to crack but withal firm strong and shape retaining. Accordingly a block or unit has finally been evolved and I have used it and previous experimental models often enough to recommend it for that group of fractures to which two piece or molded plaster splints are adapted. It is especially useful for fractures of the upper extremity notably Colles fracture and fracture of the forearm. An attempt has been made to make it useful when a long length of plaster is desired and therefore each end of the block has fastened to it an interlocking strip of aluminum. When thus locked the length of the individual blocks can be increased indefinitely. Aluminum was chosen because it is strong light weight rustless and permeable to x rays. Each block is 13 inches long 3<sup>1</sup> inches wide and contains 8 layers of this new

compounding of plaster of Paris. Each block is wrapped in thin absorbent paper and the stock splints are marketed in pasteboard boxes like boxes of socks (Fig. 111-1).

When used for example in a Colles fracture one block in a paper wrapping is folded on itself and dipped in water just long enough to soak the paper (Fig. 111-2, 3). It is immediately

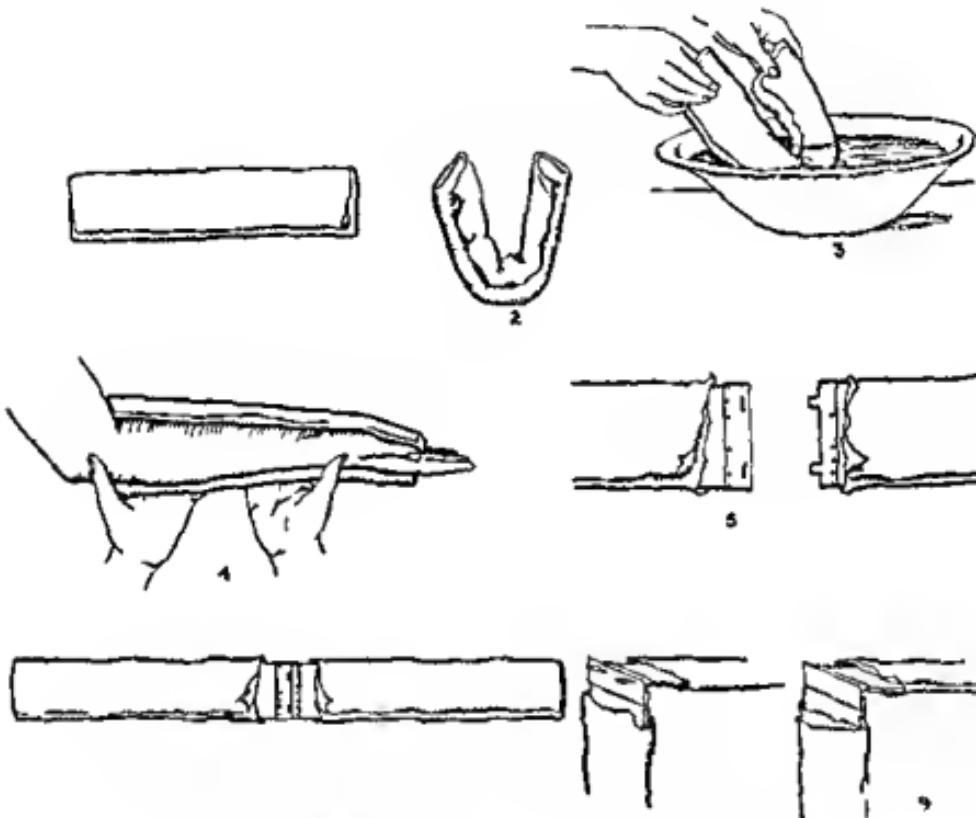


Fig. 111-1. The block splint wrapped paper 2, 3. Folded and wetting the paper wrapped splint 4. Splint applied 5, 6. All must be kept flat. Splints to each other 7, 8. Splint applied first 9. Splint applied and overlapped first through 9.

placed on the anterior surface of the forearm and will in the ordinary adult reach the proper distance, namely, from below the elbow to the end of the palm (Fig. 111-4). Another block is now selected for the dorsal half and after dipping in water it is applied to the back of the forearm paralleling the anterior block. A roller bandage now retains and smooths these blocks and

they will be quite dry in a few moments. In the application no plaster will escape and there will be no mess. If desired the aluminum end clips can be removed before or after the splint dries or they can be curved to fit the contour of the extremity (Fig. 111 5 6). At a subsequent visit the paper can be removed or it may be permitted to remain as a form of padding. No sheet wadding or other protective is necessary as the paper effectively prevents the plaster from sticking to the skin. One layer of the block is sufficient to immobilize an ordinary fracture of the upper extremity. If desired however reinforcement can be provided by using strips of basswood aluminum or all or part of another plaster splint. For use on the leg or elsewhere when length is demanded one block is locked to the other by means of the aluminum clips (Fig. 111 7). This may be done in series of two before soaking or one block may be locked onto the other after soaking. If extra reinforcement at the intersection is desired the clips may be turned on themselves, thus doubling the protection where the blocks unite (Fig. 111 9).

This form of plintage may be said to supply

- (1) Blocks or units of plaster of Paris already shaped except for the necessary molding to fit the individual case virtually a custom made process
- (2) Speed, ease and cleanliness
- (3) Strength and quick drying
- (4) Form retaining properties



## CLINIC OF DR EDWIN BEER

Mt SINAI HOSPITAL

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### PROSTATIC HYPERSTROPHY OR BENIGN ENLARGEMENT OF THE PROSTATE<sup>1</sup>

If we can judge from the literature it would seem that stones in the male bladder have been the subject of discussion as well as of therapeutic endeavor since far back in antiquity. In view of the fact that most of these stones develop behind obstructions caused by enlarged prostates it is surprising how many years elapsed before a careful study of the prostate gland was made. All members of this Society after a certain number of years acquire a more or less legitimate interest in the disease under discussion as a large percentage of our adults of the male sex over fifty years of age are liable to be troubled with this glandular disturbance in one form or another.

For a great many years the disease which we now recognize as a true tumor or adenoma formation in the prostate was considered an hypertrophy of the entire gland. Extensive embryologic and pathologic studies have been made and among others Lowsley has shown that embryologically the prostate arises from five sets of tubules which are scattered about the posterior urethra. In the adult prostate the part behind the ejaculatory ducts is absolutely distinct and separated from the lobes which are anterior to these ducts. It is mainly in this particular lobe that we are liable to encounter malignant prostatic changes. Anterior to the ejaculatory ducts we have the lateral lobes running into the middle lobe which lies under the floor of the posterior urethra in the supramontane part of the prostatic urethra.

<sup>1</sup> From the Surgical Service Mt Sinai Hospital. A clinical lecture delivered before the New York Physicians Society.

that part of the urethra above the verumontanum. In addition to the lateral and middle lobes we have a more or less developed anterior lobe. A knowledge of this anatomy is essential to an understanding of the pathologic processes which develop in these parts when adenoma of the prostate is present. The part of the gland situated in and about the urethra is liable to undergo adenomatous changes. These are usually thought to begin in the middle lobe from the suburethral glands. More rarely



Fig 112—C et f p t h g l g p o t t a m a (P G) gr w g p t bl dd d d g p o t o u r t h a w t h y p e t p h y f bl dd m it d m lt pl m a l d e t l (From T d l d Z l k k a d l)

adenoma formation occurs in the anterior lobe and occasionally there are adenomas of prostatic tissue which arise in the group of glands (just above the sphincter) known as the Albaran glands. As the periurethral masses grow in a fully developed case of prostatic adenoma they compress the posterior lobe and also often the anterior lobe against the prostatic capsule so that the above lobes are flattened out and look like thickened prostatic capsule rather than glandular tissue. From a pathologic stand

point the enlargements in this middle lobe region of the prostate are most frequently adenomas although rarely fibro-adenomas fibromyomas and fibromas grow in this area causing the symptoms of prostatic enlargement and obstruction

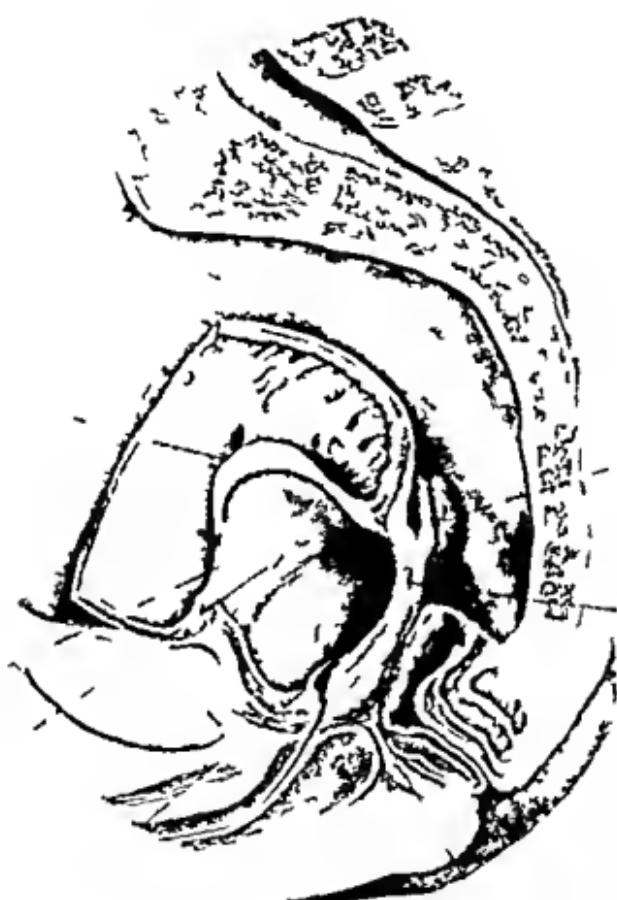


Fig 113—Same case as Fig 112 with enucleated prostate adenoma shelled out of its bed (S) (From Tandler and Zuckermandl)

The etiology of prostatic adenoma is not understood but it would seem that the irritation associated with sex activity whether gratified or not may underlie the condition. I have never seen a case develop in patients with bilateral undescended testes. These testes are usually underdeveloped and do not produce spermatozoa. Moreover unilateral undeveloped testicle

is usually associated with unilateral prostatic atrophy. Dr. Ibrahim of Cairo has written me that eunuchs never develop hypertrophy provided they are castrated when infants which bears out in a measure the above viewpoint.

All types of this form of enlargement are absolutely benign and do not metastasize and do not recur if a complete enucleation is made.

If we turn to the publications of Tandler and Zuckermandl and study their postmortem observations we can see some beau-



Fig. 114.—Same specimen  
as Fig. 113.

Fig. 112 and 113 with the bladder  
(From Tandler and Zukkardl.)

tiful illustrations of the gross pathology of the disease under discussion and the particular relationship the enlargement has to the posterior urethra in its supramontane part. The supramontane urethra is encompassed by hulking elastic lateral tumor masses and in the great majority of cases some of these tumor masses project into the bladder through the internal sphincter or are associated with a separate sessile or pedunculated tumor projecting into the bladder lumen which may act as a ball valve.

obstruction at the neck of the bladder. In some rare cases very sizable pedunculated masses develop from the Albarian glands above the sphincter and in rare instances these masses projecting into bladder may be the size of a small pear. Owing to the peculiar pathology and the compression of the surrounding tissue of the prostate by the growing adenoma you will see as illus-

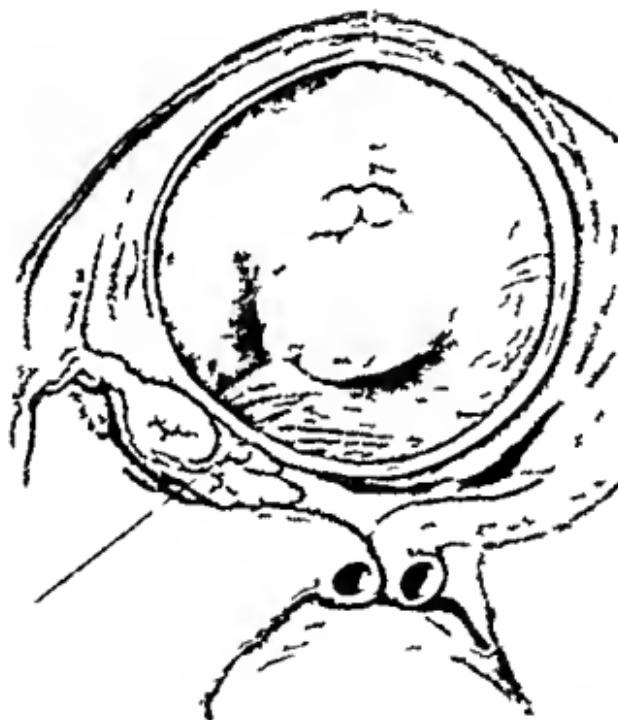


Fig. 11.—View of prostate proctectomy in a hypertrophied bladder as numerous small and large lobules surrounded anteriorly by sphincter (S) (From Tandler and Zickeraudt.)

trated in the lantern slides how easy it is if the right cleavage plane is maintained to enucleate the offending tumor much as one enucleates a cyst in the thyroid or a fibromyoma situated intramurally in the uterus.

Although the process in the prostate is essentially a benign one the secondary changes coming on gradually as they do are

far from innocuous and are liable if unrelieved to lead to irreparable damage to the urinary organs as well as to the host who is carrying the obstructing adenoma. These prostatic enlargements eventually regularly deform the neck of the bladder



Fig 116.—Part of prostate projecting into bladder seen through a little way down the bladder wall. It is passing through urethra and the bladder through prostate tumor mass. (From Tandler and Zuckerkandl.)

and produce more or less marked obstructive symptoms and in time there is developed hypertrophy of the bladder musculature to counteract the obstruction. This hypertrophy is usually symmetrical and between the hypertrophic mass of muscle tissue the

bladder will tends to give and small or large pouches regularly form. If the process continues even if infection is not superadded there is very frequently owing to the back pressure sufficient disturbance of the urinary tract to lead to dilatation of the ureters and kidney pelvis with secondary fibrosis in the kidney tissue. Traction of the vasa against the ureter also leads to obstructive hydronephrosis. If an infection develops the bladder is the first organ to suffer and the changes of cystitis with the likelihood of stone formation are always present. In a large number of cases even before infection sets in there is a good chance for stones to form as owing to the prostatic obstruction the bladder is unable



Fig. 117.—Typical specimen of lateral lobes and middle lobe removed in one piece (From Tandler and Zuckerlandl.)

to empty itself completely and just as cholesterolin stones form in the gall bladder uratic stones are apt to form by sedimentation in the urinary bladder. After infection is present however this type of stone probably never forms but phosphatic and allied secondary types of stones crystallize in the purulent residuary urine. Even before this infective stage develops there is owing to the disturbance in the kidneys a systemic upset evidencing itself by defective elimination and the heaping up in the patient's blood of the products of metabolism which should be carried off by normally functioning kidneys.

## THE MECHANISM OF PROSTATIC OBSTRUCTION

In these cases of adenoma prostatic obstruction is readily demonstrated by cysto urethroscopic studies as well as by pathologic studies made in the autopsy room. Cysto urethroskopists can readily see in the posterior urethra two lateral bulging masses which begin above or at the level of the verumontanum and embrace the posterior urethra from the verumontanum up to the sphincter region and often extending within the sphincter into the bladder where a sizable mass is visible and if of sufficient size this intravesical mass may prevent visualization of the ureters usually situated on an hypertrophied interureteric ridge. If one passes the cysto urethroscope into the supramontane urethra and looks down one can see these lateral masses bulging across the concavity of the posterior urethra which usually presents as a broad sulcus and as the water runs in or as the patient inspires deeply one can see these lateral masses separating so that the floor of the posterior supramontane urethra may be easily seen. If one turns off the flowing water however or asks the patient to press one will see these adenomatous masses on either side of the urethra coming together and approximating just as one sees the vocal cords approximate in the larynx during a laryngoscopy. The patients can close the posterior urethra by forcing these two masses together when they are asked to press or strain as in voiding and as these elastic tumors are squeezed they make a very broad apposition in the posterior urethra the posterior urethral lumen being the only space that is left into which these elastic tumor masses can be crowded. The prostatic capsule and the compressed posterior lobe do not give and cannot give in order to allow of lateral displacement of the adenoma. This peculiar vocal cord play of the prostatic adenomas may be demonstrated readily in any patient suffering from prostatic enlargement of this benign type and the fact that patients have more and more difficulty in emptying the bladder the harder they press is readily understood after one has visualized the posterior urethra in these cases. In addition to this type of obstruction which is the most common there are occasionally ball valve obstructions due to the projecting masses situated within the bladder neck.

and also at times there are bars made up chiefly of mucous membrane which are raised in the inferior circumference of the sphincter by enlarging lateral masses which project into the bladder and lift up a fold of thickened mucous membrane which in a measure occludes the internal orifice of the urethra.

The whole process of the mechanism of obstruction would appear to be therefore explicable on the basis of hydrostatic pressure. If the bladder contracts against the volume of contained water or urine it presses against the elastic adenomatous tumor masses and as the pressure is exerted against these masses their shape is changed so that the axis from above downward is shortened and the side to side axis is increased with the result that the lumen of the posterior urethra is diminished. To anyone who has examined many of these cases at operation it is well known that the prostatic urethra is usually quite large and capacious usually admitting a full sized index finger so that the old view that the prostatic urethra was strictured in these cases is absolutely untenable the obstruction being purely a potential one either of the lateral impingement type or of the other two types just referred to.

#### DIAGNOSIS AND SYMPTOMS

Diagnosis of prostatic adenomas from what has just been said is fairly simple if a cysto urethroscopic examination is made. But even without this the symptoms are so clear cut that the average physician should be able to establish the diagnosis and the indications for operation with a knowledge of the history and a physical examination of the prostate reinforced by the use of a catheter to determine residual urine.

Prostatic adenoma formation begins usually to show itself in men over fifty years of age although occasionally one sees patients with well marked adenoma formation as early as the fifth decade. These patients usually complain of frequency of urination which manifests itself most disagreeably at night so that sleep is interfered with the frequency during the day being usually less striking although usually present. As the frequency becomes more marked there is usually associated therewith a

delay in starting the stream and a notable weakening of the stream. This often leads the patient to consult a physician and frequently at this stage of the disease the urine is perfectly clear and may at most contain but a trace of albumin. If infection has been added of course evidence of a cystitis is present in the urine. Digital examination through the rectum will almost invariably show a moderate enlargement of the prostate which is usually bilobed elastic smooth and non sensitive. By bimanual examination the patient lying in bed the prostate may often be definitely outlined with the abdominal hand and its exact size in this way determined. The introduction of a catheter into the bladder after the patient has voided will almost invariably show a residue which the patient is not able to evacuate. This residue varies very considerably depending upon the patient's recognition of his early symptoms. If the patient recognizes the symptoms at the beginning of the disease there will be as a rule very little residual urine whereas if the disease owing to its insidious onset is recognized late some of these patients come to our office with their bladders containing over 50 ounces of residual urine. It is surprising to see how these patients accommodate themselves to this condition and often they are not at all cognizant of the fact that they have these enormous quantities of residual urine. Even physicians have often come to my office with their bladders almost up to the level of the navel not at all cognizant of the fact that they have 20 to 30 ounce of residual urine which they must have been carrying for a long time. Less frequently the first evidence of the disease is an acute retention. The prostate apparently becomes suddenly congested and the bladder is so obstructed that the patient is unable to pass his urine.

In those patients who do not have acute obstruction symptoms there is a gradual disturbance in body function due to the disease of the kidneys and the defective elimination and this may evidence itself in the symptoms so commonly associated with contracted kidneys. There is loss of weight loss of appetite loss of interest in daily work and owing to loss of sleep a general weakening of the morale which prevents attending to business

normally. Occasionally some of the patients with this condition—owing to its long standing character—may present themselves with evidence of severe bladder or kidney infection. Even before infection develops many of the patients are liable to have calculi form in the bladder or within the diverticula or pouches which have developed as a result of the obstruction and the outstanding complaint is pain due to formation of these stones. It was at this stage of the disease that the condition attracted the attention of the older physicians even in antiquity and the ability to remove these stones by cutting operations produced that class of surgeons known as the lithotomists. Although cystoscopy is indicated as a diagnostic procedure in most of these patients one must not rush in blindly in every case as the stiff steel instrument is apt to produce serious trauma and at times serious hemorrhage. The cystoscopic examination with the examination of the posterior urethra showing as it does regularly the changes mentioned previously is of absolute diagnostic value and is particularly useful in determining the presence of stones and of congenital or acquired diverticula as well as the presence of complicating tumors of the bladder which although not common are sufficiently common in association with prostatic adenomas to make cystoscopy a particularly valuable agent in the diagnosis and study of this disease.

Another very useful method of examination is the cystographic as well as the x ray of the whole urinary tract. In enlarged prostates of this benign type the filled bladder (12½ per cent sodium iodid being used to fill the organ) will be seen well above the symphysis pushed up by the enlarged prostatic mass. In addition the irregularity of the bladder wall will often demonstrate the presence of pouches or diverticula as well as occasionally an incompetence of one or the other or of both of the ureteral orifices if the ureters become filled with the fluid introduced into the bladder through the catheter.

All patients with prostatic enlargement should be given the benefit of a general x ray of the genital urinary tract to determine

the presence of stones the size and position of the kidneys and whether above the bladder there are present concretions within the ureter or ureters or kidneys. This routine examination is of inestimable value and will often decide what steps should be taken at the time of surgical interference.

### THERAPY

Although the radical cure of this disease is obtainable through surgical interference alone it is only during the last twenty years that the technical problems have been properly estimated and the operation placed upon a firm and satisfactory basis. There is no group of case in which surgical procedure gives such perfect relief in patients of advanced years and during the last twenty five years the improvements in preoperative preparation and operative anesthetic technic and in postoperative care have so reduced the mortality that unless there are serious contraindications present one rarely hesitates to recommend the surgical removal of large obstructing prostatic adenomas which are causing sufficient symptoms.

If on the other hand the symptoms are mild the residual urine very low and the general health in no wise interfered with it is well to bear in mind that many patients can avoid surgical interference and enjoy health and happiness without an operation.

A great many methods of treatment in the mild cases have been suggested but none of them is absolutely reliable. Massage of the prostate through the rectum has been vaunted by many but it rarely gives more than temporary relief. The administration of drug like fluidextract of ergot also occasionally gives relief by relieving the congestion in and about the prostatic tumor. Of late the use of dathermy through the rectum has apparently given some beneficial result. Radiotherapy has failed to live up to expectations. Cures taken at Wildungen as well as at Contrexeville often give the patients some relief and postpone the operation for years. All these conservative measures are unfortunately not regularly effective. The water cures which are taken in the summer months when the patients perspire

profusely are liable to relieve congestion of the internal organs and give temporary relief but often these same patients during the winter months have an aggravation or an increase of their symptoms so that they ask for surgical interference. If surgical interference is decided upon (and social and economic conditions as well as surgical indications often decide the problem) the patient must be carefully studied before being submitted to operation. At the present time very few patients who have been treated by conservative measures without result are willing to be regularly catheterized to relieve them of their obstructive symptoms but on the other hand some patients are such wretched risks that surgery cannot be offered to them and they must be satisfied with regular catheterization night and morning with lavage of the bladder to relieve them of the residual urine which annoys them throughout the night as well as throughout the day. Many of these patients after years of catheterization having become infected find life unbearable and seek palliation of their misery by such simple operative procedures as supra pubic cystotomy and permanent drainage or are willing even to risk the major procedure of the removal of the tumor in the prostate.

Before operating on any patient one should make a careful study of the cardiovascular system and the renal function. There is no doubt that in these advanced ages myocarditis and coronary disease may produce complications which can be fatal. It is also very evident that these two conditions are very difficult even for the most expert heart specialist to recognize. At times patients indicate by their history of shortness of breath, precordial distress on exertion or even without exertion, inability to lie flat in bed, inability to climb stairs or do any manual work without distress that they have disturbance in this important system.

Then too renal function is one of the most important conditions that must be studied. In estimating renal function the most simple aids have been the use of indigo carmine and of phenolsulphonephthalein for the study of the combined function and the retention of waste matter in the system. The blood

chemistry including the estimation of the urea nitrogen, uric acid, cholesterol, sugar and carbon dioxide should be complete. Perhaps the most important single functional test that has been devised in the last fifteen years is the blood chemistry test. Patients with moderate residual urine will often show a diminution or absence of indigo excretion while showing a normal or lowered phthalein excretion and a normal blood chemistry but if the disturbance in kidney function progresses there is almost invariably added to the diminished indigo output a reduced phthalein output and an accumulation of retention products in the blood. Experience has shown and there are very few exceptions in the clinic that patients with marked disturbance in kidney function (provided the disease of the kidneys is symmetrical) will in the great majority of cases develop an improvement in the output of indigo or phthalein and a diminution in the blood retention products which will permit of operative procedure following the use of systematic catheter drainage of the bladder. If these improvements do not take place and if the blood figures remain two and three times as high as the normal limits the chance of a successful outcome is very much diminished. It is difficult to say what the highest figures of blood retention are that will permit of surgical interference. Whether we dare operate on patients whose blood retention figures are higher than 30 blood urea and correspondingly increased figures for the other constituents is very doubtful. Occasionally when the supravesical disease is asymmetrical the dye excretion and the blood chemistry are abnormally influenced by toxic agents or reflex conditions due to absorption from one of the kidneys with its effect upon the other. This group of asymmetric supravesical diseases presents a problem which is particularly difficult to discuss before a non specialist audience but it is one that must be borne in mind in the interpretation of the laboratory studies.

Fortunately most cases of prostatic obstruction are associated with symmetrical supravesical disease and this difficulty briefly outlined above does not upset our calculations. In addition to the above the pulmonary condition should be investigated to avoid any unnecessary pneumonias and the blood

pressure should be regularly controlled as a high blood pressure may contraindicate the use of nitrous oxide gas or ether because of the danger of apoplexy.

Having made a careful preoperative study and having decided upon operation the question will arise How shall the prostatic adenoma be attacked? For many years the favored route was the perineal and that was based upon not only theoretical considerations but very practical ones. Theoretically it was believed that a perineal prostatectomy would give better drainage of the bladder during the convalescence but practical experience has shown that that was a purely gratuitous assumption. The practical point however that maintained the position of the perineal operators was that the mortality was considerably lower by that route than the mortality of the suprapubic prostatectomy. It is highly doubtful whether this obtains at the present day. It was not so long ago that men equally skilled in the perineal and suprapubic operation (for instance Zuckerkandl) admitted a much higher mortality with the suprapubic operation than with the perineal but nevertheless he favored the suprapubic operation because following the perineal operation every once in a while there was incontinence of urine as a result of the operation loss of erectile power and less frequently rectal fistula.

During the last twenty five years such enormous progress has been made in technic that there is no marked difference in the result obtained as far as mortality is concerned between the two methods. In going over a series of fairly recent suprapubic prostatectomies done by myself I find that the mortality in private cases is a little below 5 per cent while the mortality in ward cases is a little higher than 5 per cent. This covers a series of over 180 prostatic operations by the suprapubic route.

A much more important question is whether the operation shall be done in one stage or in two stages and although the mortality in the two stage operation is only slightly lower than in the one stage operation I am convinced that if the one stage operation were done in all cases the mortality of suprapubic prostatectomy would be much higher than it is at present for the

simple reason that only the very best risks are submitted to a one stage operation while the questionable risks are operated on in two stages. I am fully convinced therefore that the two-stage operation is the operation of choice though occasionally when large diverticula are present one's hand may be forced as it may be more shocking to do a prostatectomy in two steps when a diverticulum has to be removed following a preliminary and usually ineffectual drainage operation. In these cases one is forced to remove the diverticulum at the first operation and if one does a removal of such a diverticulum one might just as well go on and remove the prostate at the same time. The great advantage of the two stage operation is that the bladder becomes anchored in the prevesical space and the perivesical tissues become shut off so that when the second stage is done there is a certain amount of local resistance and immunity which protects the perivesical tissues by scar tissue. In addition to this the prostatic adenoma shrinks very remarkably while the patient is waiting for the second stage so that there is comparatively little bleeding following the enucleation. The first step of the operation is done usually under local anesthesia the bladder having been washed out prior to the operation and novocain introduced into the bladder so that the operator after opening this viscus can palpate the interior and confirm his preoperative diagnosis. The second stage or enucleation is done under gas a week or so later provided kidney function and condition of wound permit without any extensive opening of the originally sutured wound.

Although the postoperative course in most of these cases is likely to be uneventful very little instrumentation being required every once in awhile in anywhere from 10 to 20 per cent of the cases an attack of acute epididymitis develops. Whether this can be regularly prevented by a vas section is still doubtful as recently from Marion's Clinic where vas section is regularly done some 4 cases of epididymitis have been reported. Fortunately this is usually an unimportant though painful complication. Another accident—if we may call it such—is the development of a pyelitis or a pyelonephritis at the time the pa-

tient begins to void. Whether the chills and temperature which herald this complication are really due to an ascending infection of the kidneys or due to an absorption from the still raw surface of the posterior urethra is not clear. Quimby, of Boston favors the former interpretation but as yet I do not believe the evidence is sufficiently clear to attribute all these chills and high temperatures to such a kidney infection. Very rarely if the operation of enucleation is poorly done a stenosis in the internal sphincter region may develop and only recently in 2 cases in which an inexperienced operator performed the operation veins formed at the internal orifice of the urethra which had to be cut through to re establish normal continuity of bladder and urethra.

The suprapubic wound usually closes without any instrumentation of the urethra though occasionally it must be assisted by the use of an indwelling catheter. Under certain circumstances the suprapubic wound is very liable to stay open and one must always search for causes for this persistent suprapubic leakage in cases where drainage is still present after four weeks. My experience has shown that infected diverticula of the bladder when of good size will almost regularly prevent a suprapubic wound from closing. I have also noticed that pus kidneys especially stone kidneys will often prevent a suprapubic wound from closing after such an operation as above described and my experience is that after removal of such a kidney or such a diverticulum closure of the suprapubic fistula has taken place. It is hard to understand why infection in this way should keep the wound open because as a matter of fact all these cases are infected throughout their stay in the hospital the prostatic bed being a granulating surface.

The results as far as function is concerned after such a suprapubic operation are ideal and there is no class of cases that is more grateful for the relief obtained. They usually void a good stream. The urine is at first turbid but rapidly becomes clearer or clear unless there is a kidney infection or a kidney stone with infection or unless a diverticulum has been overlooked or unless the bladder wall is full of infected small pouches. The residual urine

decreases to a negligible quantity and all the functions are restored. There is rarely if ever incontinence and the frequency of urination rapidly abates. As far as the sexual act is concerned owing to the more or less regular destruction of the internal sphincter the spermatic fluid is almost regularly retrojected into the bladder. After such a prostatectomy rectal examination will often amaze the uninitiated because palpation of the prostate through its posterior lobe often fails to show a marked diminution in size of this organ. That is readily understood from the previous analysis of the gross pathology of this condition.

Interesting postoperative studies have been made by myself and my staff of the condition of the posterior urethra. If one examines these patients cysto urethoscopically one finds that the position of the old prostatic adenoma is now occupied by a more or less capacious cavity which may be for months of sufficient size to demonstrate cystographically. Gradually this shrinks to some extent but if the internal sphincter of the bladder is permanently damaged as so often happens this posterior urethral cavity will fill with the bromid or iodid which has been introduced into the bladder so that we see the bladder cavity and below it the bed of the former adenoma filled with the opaque fluid.

In this review of the subject of prostatic adenoma I have tried to give you a brief general outline of many of the problems presented by this interesting group of cases and have studiously avoided delving into the more specialistic phases of the subject which might make less of an appeal to such an audience as is presented tonight. If I have succeeded in giving you a new and clearer picture of that which many of us will surely suffer from in let us hope a very far distant future I shall feel amply repaid for my labors in presenting my views before this audience.

## CLINIC OF DR J EASTMAN SHEEHAN

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### FACIAL DISFIGUREMENTS FUNCTIONAL RESTORATION THE CHIEF CONCERN IN REPAIR OF FACIAL DEFECTS

#### 1 NASAL DISFIGUREMENT: RECONSTRUCTION BY READJUSTMENT OF NASAL TISSUES

INJURY by direct trauma exaggerated by reason of weakness of nasal supporting structure, following resection of the septum

The disfigurements resulting were a simulated protrusion in the area of the nasal bones produced by the shrinking of tissue lower down depression at the cartilaginous bridge lower lateral cartilages hypertrophied with consequent widening of the lower nose retraction of the columella caused by dislocation of the septal buttress from the spine of the maxilla partial drooping at the nose tip nose twisted and crooked

Procedure—Incisions within the alar rim on both sides back far enough to conserve the rim From this curved incision separation of tissues freeing lower and upper lateral cartilages Of the lower approximately two thirds was excised and of the upper nearly all the procedure was the same on both sides As preparation for readjustment of nasal bones first the skin was undermined up to the glabellar area and well outward on the cheeks then careful separation of the deeper tissues followed by incision of the periosteum at the median line and separation of the periosteum outward past the junctions with the maxilla After a reduction of the protrusion by the excision of a little of the bone along the line of the arch the nasal bones were fractured at the junctions with the maxilla and pressed inward by the thumbs to form the new line of the dorsum as to that part The dislocated septum was returned to its true relation and made

fast at the philtrum by through and through mattress sutures of paraffined silk. The position was later secured by two pieces of stent. Pieces of the lateral cartilages that had been excised were superimposed, sewn together and inserted to fill the depression on the cartilaginous bridge which had been modified by reduction of the simulated protrusion of the nasal bones. To correct the distortion of the columella and at the same time eliminate the droop at the tip the columella was freed from the

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Fig. 118.—Sald figure in and t n

septum by an incision carried vertically along the line of junction after which they were re-united by means of the orthopedic stitch. The points of insertion in the septum being above those in the columella the latter was raised slightly when the stitches were tied the effect at the tip being to substitute for the disfiguring droop a form slightly retroussé.

**Comment**—In all but the exceptional cases this method of correcting disfigurements serves every purpose and is much to be preferred because of its simplicity. In most instances the

key to the procedure is the fracture of the nasal bones at the junction with the maxilla. Severe trauma may distort or flatten these bones but after the separation they can be raised to reform the normal arch. Spurs or other protrusions are to be excised by the chisel before the separation is made. Widening of the lower part of the nose is generally associated with hypertrophy of the lower lateral cartilages. Since these must be reduced by excisions it is obvious that the parts excised offer a material



Fig. 119.—Nasal disfigurement after correction

suitable for filling a depression on the dorsum provided the septum supplies a sufficient support and provided that in reconstructing the nasal bony arch the size of the ultimate depression below it is kept in mind. The bits of cartilage can be fitted end to end or superimposed according to the need. In either case they are welcomed by the tissues do not disintegrate and maintain the position assigned to them. Flattening of the nose and distortion at the tip point to distortion of the septum frequently with dislocation at one or other of its contacts with the bones

In most cases it can be adapted to its function of supplying a buttress for the bridge even if some excision is necessary to relieve a blockage of the airways. By means of the orthopedic stitch the distortion of the columella inevitable if the septum is out of place can be corrected and with it the similarly inevitable distortion at the tip. Re alignment at the tip is the most delicate part of these procedures and sometimes necessitates a small angular excision from the septum or for the contrary purpose the advancement into the columella of a similar strip.<sup>1</sup>

All the procedures here described are done under local anesthesia. Bandages are used only for support until reorganization has set in and a plint with movable parts is to be preferred to the bandage as it leaves all the parts in view. Care in undermining the skin and in the separation of the deeper tissues prior to the separation of the bones as mentioned above since it respects the vigorous circulation eliminate much of the ecchymosis and other sequelae so that the patient is able to leave the hospital in three to four days.

## 2 IMPROPER USE OF COSTAL CARTILAGE SUPPORT

**Comment**—For the reasons just given there is no need to expose the patient to the severity of surgery at the chest if there is reasonable expectation of being able to reconstitute the nose from its own materials. Moreover it happens as in the case to be described that such cartilage implants may be so inserted as to defeat the object of the repair with such results as are shown in the photographs.

**Clinic**—The patient had submitted to four previous attempts at repair. The cartilage implant had been made without sufficient recognition of its relation to the other tissues was badly shaped and badly placed. The upper nose was both too wide and protuberant and in the lower area pressure on the cartilages had flattened and displaced them also distorting the columella.

Procedure—Incisions within the alar rims at a distance sufficient to conserve the rims. Excisions from the lower lateral cartilages of all but enough to maintain the form of the ala.



Fig. 120—Improper use of costal cartilage Before



Fig. 121—Improper use of costal cartilage Before

Skin undermined to glabellar region and outward over the maxilla. Cartilaginous implant removed and discarded. Wide separation of the periosteum over the nasal bones. Nasal bones freed



Fig 1 — Imp op of co tal cart l ge. Alte co to



Fig 123 — Imp op se f o tal cart lag After co ect on

by chisel from contacts with maxilla pressed inward and elevated to form upper line of bridge. Line of dorsum continued by insertion of morsels of lower lateral cartilage to fill depression. Columella freed from septum by vertical incision and orthopedic stitch employed to overcome columella retraction and lift the tip. Patient discharged in three days and returned in ten days with mild infection in the upper quadrant. This was incised and drained and healed with no ill effect on the repair. The photographs were taken at this stage.

### 3 PROPER EMPLOYMENT OF COSTAL CARTILAGE

The patient was injured in a motor accident so severely as to be unconscious for some days. Mutilations from deep wounds on the face were marked by angry hypertrophied scar. The bony



Fig. 124.—Showing loss of teeth and other injuries about the mouth

arch had been driven in until it was almost flat. The philtrum had been blotted out by deep wound and loss. There was loss of the mucous membrane of the lower lip and cheek with some trismus. A fracture of the lower jaw at the middle was accompanied by loss of teeth at that part.

Procedures—After resetting the fractured bone first attention was given to the loss occasioning dysfunction. By transplanting an epidermic graft the lip was restored to normal, the mouth epithelialized and the trismus eliminated. It then became possible to replace the missing teeth.

Attention was given to those scars which had keloid appearance. Here the method employed was to shave down the scar including some of the adjacent normal skin, thus widenning



Fig. 125.—Proposed implementation of the Codd theory.

the area. Hygroscopic threads were inserted crossing the wound line and penetrating to the papillary and subpapillary skin levels. Rubber tissue and oil were applied for protection and removed after three days. Afterward fractional doses of x-ray were applied and the skin cleared off nicely. (The number of treatments depends on the reaction.)

Attention was also given to the other scars on the face and nose.



Fig. 126—Proper employment of costal cartilage After correction (Note Mouth position to illustrate function Also epidermic graft at side of nose )



Fig. 127—Proper employment of costal cartilage After correction

A separate procedure was required for correction at the upper lip. The tissues were exposed and the severed muscle strands reassembled and freshened. On the line corresponding to the philtrum stitches were so inserted as to produce an introversion thus restoring the cleft that had been blotted out by the wound.

Rearrangement of the nose tissues disclosed the necessity of supplying a strong support for the bridge which was obtained from the costal crest. The incision employed followed the curve of the crest (This was under local anesthesia). When the cartilage was shaped and inserted it was found that a strain was imposed upon it originating with the loss of some tissues and the adherence of remainders. Release of these tissues and excision of contractile skin and the covering of the resulting defect by Thiersch (epidermic) graft freed the implant from strain and facilitated such realignments as were indicated. Had the tension noted been allowed to continue the cartilage would have been drawn to that side carrying the bridge out of line. Where there is no tension the cartilage will stay as placed. It adheres to its base by firm fibrous connections and there is no degeneration of the outer cells.

#### 4 TYPICAL WINDSHIELD WOUND

This patient as the result of a motor accident had a wound which extended from the brow through the eyelid at the inner canthus and far down on the face. The wound on the face had gone through to the bone and the scar was hypertrophied. The fibers of the orbicularis had been cut in the vertical direction resulting in partial inability to close the eye and there was injury to the tear sac with consequent continuous epiphora.

Procedures—Functional restoration being the first concern a modification of the Dupuy Dutemps operation was utilized to rehabilitate the tear sac and restore the lacrimal flow. Then the orbicularis muscle was exposed and the strand on one and the other side of the wound were dovetailed care being taken to restore the continuity of the mm. The skin wounds on the lids healed nicely after approximation the line of reorganization being barely perceptible even at first. After a little the difficulty

in closing the eye disappeared. The scar representing the wound through the eyebrow was given attention and when this was completed the direction of the line had been shifted to disguise its identity with the line on the face.

Treatment of the lower disfigurement began with excision of the scar after which the skin on both sides was undermined and retracted exposing the tissues, which were then freed from their adhesions and rearranged as nearly as possible in their



Fig. 128—Typical windshield wound  
Condition on entry



Fig. 129—Windshield wound  
After correction

normal relations. At one point the suture was so inserted as to produce a slight introversio. When the skin cover was replaced this gave the effect of a dimple. The photograph was taken two months later.

##### 5 ANGIOMA OF LIP AND MOUTH

**Comment**—Notwithstanding the popularity of other methods of dealing with angioma notably the experiments with radium

and x rays extirpation is the best of all methods if the affected area is within reach. Instances might be quoted to show that after liberal use of one or both the tissues adjacent to the vesel tumor have been completely devitalized but without much interference with the tumor itself. Where extirpation can be followed by replacement the repair leaves little to be desired.

Clinic.—The patient exhibited a tumor on the lip that was notably disfiguring. There was a history of radium and x ray



Fig 130.—A gi na fmo tha dlp  
(Not d t ton by t atm t )



Fig 131.—Angiom of m tha dlp  
(Aft o t n)

treatments with visible destruction adjacent to the tumor particularly within the lip accentuating the deformity.

Procedures.—Separation beginning at the lip was carried within the mouth revealing that the tumor extended as far as the pterygoid process. The vessels were there clamped above the tumor which was then dissected out and the membrane approximated. The devitalized tissues on and within the lip were cleared away and were replaced by a flap of mucous mem

brane swung from the sound side of the mouth. Incidentally the replacement restored the vermillion border. Recovery was uneventful and rapid.

#### 6 DISFIGUREMENT FROM TISSUE LOSSES

This disfigurement had lasted eleven years. The patient being at that time in Italy had a dentist extract a painful tooth. Following the extraction his jaw sloughed and the cheek also. Trismus ensued and became permanent. He was able to take food only through the hole in the cheek. It was evidently a case of noma. He was seen by surgeons in Rome Bologna and



Fig. 132.—Disfigurement from tissue losses. Condition on entry.

Florence with one or more attempts to relieve the condition made by surgeons in each city. Surgery for the relief of an abscess had produced extra scar and scar had replaced the mucous membrane from the lip to the pterygoid area.

**Procedures**—After excision of the external cicatricial areas and replacement by an epidermic graft the mouth could be opened. As preparation for the next step dentures were made and applied to the upper and lower teeth. These were first

utilized to hold the stents on which patterns of the denuded areas above and below were obtained after the removal of the scar tissue within the cheek. Epidermic grafts from the arm were wrapped around these stents which were again attached to the dentures and firm steady apposition of the grafts to the defect was obtained by locking the dentures. During the five days the molds remained in place the patient was fed through the nose. The graft took *in toto* there was no infection but the epidermic graft succeeds even where there is. While the epidermic graft form a satisfactory substitute for mucous membrane



Fig 133—Diagram of the cheek defect and the pedicled graft.

in such positions it has a tendency to shrink. It was therefore necessary to maintain it on stretch for from two to three months. To this end the molds of stent were replaced by vulcanite fastened as before to the dentures and removed for cleaning every day or second day during ten weeks.

During this period preparations were made for covering the defect produced by the losses on the cheek. After careful measurements made to allow for the mouth being open the arm was marked for a tubed pedicle which should supply double the quan-

tity included in the measurements. First the inside of the mouth was covered the outside of the skin flap being inward to provide a lining. Afterward an equal amount of skin surface was placed over this lining raw surface to raw surface so producing a cover to which the lining was attached. Incidentally to these procedures the muscles about the corner of the mouth were rearranged so as to be brought into combination of action and later some strands of the adjacent muscles were inserted between the inner and outer parts of the skin that replaced the cheek both with marked benefit to function at the mouth and on the cheek. The vermillion border was restored by means of mucous membrane brought up from the interior of one lip and down from the other.

The patient has a position and is self supporting. Exposure to the elements has mellowed the appearance and has made it somewhat difficult to distinguish the replacement. As he is blond and has no beard there is never anything to attract critical observation.



## CLINIC OF DR. JEROME SELINGER

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### CHRONIC APPENDICITIS

It is unfortunate that following a laparotomy the surgeon will frequently receive a dubious look from his colleague when reporting that chronic appendicitis was the only pathology found. This dubious look is not unlike the one a perfectly innocent individual receives when he mentions his intention of taking a trip from these dry (?) United States into one of the wet provinces of Canada.

I said unfortunate—but perhaps I should say fortunate—for these doubting Thomases unquestionably serve a purpose. They stimulate and make us prove that chronic appendicitis is a distinct clinical and pathologic entity.

Chronic appendicitis in certain sections of the country and in the hands of certain operators has come into disrepute for definite and logical reasons. Unquestionably many an individual has had his appendix removed for abdominal pain when the source of the difficulty was not located in the appendix or in the tissues immediately surrounding it. This unfortunate circumstance however though at times unavoidable should condemn the specific diagnostic ability of the surgeon in question rather than the clinical entity chronic appendicitis. And it should not bring forth such a sweeping and at the same time narrow statement as "There are only two kinds of appendicitis—acute appendicitis and appendicitis for revenue only."

Physiologically the ileocecal valve is a point of natural stasis. In that respect it is not unlike the pyloric end of the stomach. Furthermore it presents these points which are of distinct importance a change in chemical reaction from alkalinity to acid

ity the greatest degree of bacterial life and an area predominating in lymphoid tissue

Chronic appendicitis with an actual involvement of the mucous and other coats of the organ is of two main types First chronic catarrhal appendicitis which affects the mucous membrane only This type is rare for the offending organism is not often confined to but one coat of the appendix Second chronic interstitial appendicitis which involve most or all of the coats as is demonstrable on microscopic examination

This organ presents other afflictions of a chronic nature which though more or less rare are of importance They are (1) tuberculosis (2) actinomycosis (3) fibrosis (4) carcinoma (5) other tumors Obliterative appendicitis is a not infrequent chronic form of the disease producing troublesome symptoms due to a pinching of the nerve filaments

From a pathologic point of view and to strengthen the case for chronic appendicitis it might not be unwise to mention some statistical data based upon postmortem examinations Kraussold is of the opinion that one third of all adult bodies reveal a diseased appendix Deaver and Toft have had the same general experience Kelynack places the percentage somewhat lower The fact remains however that of 1000 autopsies on patients who died of a condition foreign to appendicitis approximately 300 of them had chronic changes in that organ as proved by pathologic examination

The advocates of chronic appendicitis should not fail to be cheered when reviewing statistics relative to disease of the famous abdominal triad —stomach gall bladder and appendix When removing a presumably normal appendix in the course of an operation for cholecystitis or for ulcers of the stomach or duodenum Deaver found the appendix diseased in 90 per cent of the former cases and in 60 per cent of the latter

Numerous adventitious bands of an adhesive or constrictive nature may furthermore give rise to distinctly aggravating symptoms

The Jackson membrane and other membranes and bands due to disease without the organ failure of the appendix to de

scend and properly rotate coitis and salpingitis and many other conditions may so contort the appendix as to produce a chronic disturbance which is relieved only by surgery. These adventitious bands may produce one or more kinks in the appendix which during active peristalsis become aggravated and



Fig 134.—The appendix in this case was bound through its entire length to the inner surface of the cecum. The membrane holding it was dense but practically bloodless. The pathologic report on this specimen read "Negative appendix."

may eventually constrict or section a smaller or larger part of the organ. One is then vulnerable to an acute attack of a fulminating nature. Foreign bodies, fecoliths and a variety of worms are further factors that may cause persistent irritation and result in definite pain and a subsequent chronic appendicitis.

One should not be disturbed if the pathologist reports in such cases that the appendix is not the seat of an inflammation. The surgeon is thinking in clinical terms and has the advantage of seeing the organ as it lay when the abdomen was opened. The pathologist is reporting what is seen on microscopic section.

A typical case of chronic appendicitis is generally easy to diagnose. Pain—or more often a dull ache—indefinitely located



Fg 135—In add t t th pp t o t t f th s ppe d t th  
clubb d e t m ty c ta ed a l g e f c l th The p th log c p r t o th  
spec m n e d Heal d ppe d t

in the right lower abdomen is perhaps the most constant and important symptom. It is present any or every hour of the day or night bears no relation to the ingestion of food may be constant occasional intermittent remittent or so vague as to be hardly noticeable. One's attention is generally attracted to it by its persistence rather than its severity. An individual otherwise normal will ignore for years a vague mild abdominal pain

occurring at intervals. Superimpose upon this one or more additional symptoms and the careful surgeon will when taking a complete history recall to the patient's mind this long standing pain.

Next in importance is tenderness. Deep palpation and not infrequently superficial palpation over McBurney's point will reveal a definite soreness.

An infective as well as an irritative lesion of the appendix will by its constant action so fatigue the innervation of the cecum and ascending colon as to cause them to dilate. Percussion will therefore give a resonant note indicative of gaseous distension. The percussion note over the descending colon and sigmoid is dull.

Constipation is the rule in chronic appendicitis. There may be intermittent attacks of diarrhea.

Light palpation over the right rectus muscle may elicit a slight rigidity. When present this is a valuable adjunct.

Nausea—bearing no relation to the ingestion of food—is an important diagnostic aid. It is generally quite transient or merely suggestive. Vomiting which is such an important symptom in the onset of acute appendicitis is rarely encountered in the more frequent chronic form of the disease.

The type of chronic appendicitis indicated above and presenting such an array of symptoms is not difficult to diagnose as much cannot be said for the type whose symptoms are wholly referred.

Indigestion broadly interpreted with no local sign of disease of the organ may be the only symptom of chronic appendicitis. The indigestion is manifested by a sense of fulness in the epigastrium—perhaps with nausea or vomiting—and is very suggestive of disease of the upper abdomen.

The recent great strides in experimental physiology should leave no doubt in one's mind that a diseased appendix may by reflex action so influence the function of distant organs as to markedly disturb that function and subsequently produce definite symptoms. Furthermore it requires no stretch of the imagination to realize that such a reflex action if continued for

an appreciable time may quite easily lead to or result in a gross lesion of the organ disturbed. The appendix, stomach, duodenum, gall bladder and pancreas are so closely related functionally—so interdependent—that derangement in the function of any one of them could quite easily cause a dysfunction and subsequent disease in any or all of the others.

These cases where the symptoms of chronic appendicitis are referred to the upper abdomen are so atypical as to make a diagnosis quite difficult or impossible until the abdomen is opened. Such a patient may complain of pain at or above the umbilicus which more often than not is exaggerated by the ingestion of food. Certain article of food which on one occasion cause or increase the pain may at other times be eaten without distress. Furthermore there is no periodic recurrence of the pain in reference to the fixed hour of eating. There may be period of days or weeks with more or less constant pain followed by a longer or shorter period of complete relief. This history is certainly indefinite—one might say almost capricious—as to onset relation to food taken and duration. They are distinctly and wholly variable—a condition that does not obtain in the symptom producing stage of ulcer.

In ulceration of the gastroduodenal segment there is of course a definite destruction and loss of tissue. During the formation of the ulcer the symptoms vary and it is then that they are likely to simulate appendicitis. When however the ulcer has been established the most outstanding feature is the regularity of the symptoms produced. According to Heyd the element of regularity is present in 90 per cent of all gastroduodenal ulcers. He further states after the analysis of a large group of cases that four symptoms are particularly noteworthy by reason of their constancy, periodicity and their precise and daily occurrence:

- (1) Pain truly epigastric and of variable intensity
- (2) the onset of pain bears a definite time relationship to the ingestion of food
- (3) this time relationship after being established is periodic and occurs day after day upon the ingestion of the same articles of food
- (4) a definite chronicity usually estimated by weeks

It is the absence of regularity in the symptomatology

of the chronically diseased appendix that differentiates it from gastroduodenal ulceration

Disease of the gall bladder and biliary apparatus may be conveniently divided into four progressive stages (1) The infective stage, being characterized pathologically by a low grade infection of the coats of the gall bladder with subsequent cicatricial contracture and a thickening of the wall of the organ (2) calculus formation in which the bacteria, leukocytes, dead tissue cells and perhaps cholesterol form the nucleus for one or more stones (3) stage of colic when a stone of greater caliber is expressed into the cystic duct of lesser caliber (4) involvement of one or more of the surrounding organs particularly the liver and pancreas Between the third and fourth stage there may be an intermediary stage of jaundice dependent upon occlusion of the common bile duct

Gall stone colic and jaundice are usually easy to recognize and should not be confused with chronic appendicitis However the early stage of gall bladder disease may be completely confounded and impossible to differentiate This stage of cholecystitis is characterized by indigestion but it is not so capricious as the indigestion of chronic appendicitis It generally occurs soon after or during the ingestion of a hearty meal or one particularly rich in carbohydrates or starches It is manifested by a distinct sense of fulness at or about the ensiform cartilage and is relieved temporarily or partly by successive eructations of gas

Not infrequently there is an annoying sense of nausea By experience the individual is able to relieve this by titillating the palate and emptying the stomach This condition may exist for many years The individuals are generally well nourished and of a happy disposition

A carefully taken history will generally enable the diagnostician to differentiate between low grade chronic cholecystitis and chronic appendicitis However it must be admitted that a differentiation is sometimes impossible

I am of the opinion that a beginning right sided inguinal hernia or even a left one is very frequently overlooked in one s

ambition to clinch the diagnosis. Comparatively little has been written regarding the confusion of these conditions.

It must be quite evident that the hernia lipomatous—that almond shaped piece of fatty tissue which is so often a forerunner of inguinal hernia—dragging behind it into the internal abdominal ring a sliver of peritoneum must produce intermittent pain not unlike that caused by an adherent or malfunctioning appendix. This constant drag—occurring particularly when the individual is in the erect posture—in the absence of a bubonocle or impulse with the finger inserted in the external abdominal ring—could hardly give rise to the diagnosis of inguinal hernia. The condition therefore must not infrequently pass undiagnosed until such a time as some extra strain or effort brings forth a bulge in the inguinal region. This may not happen until months after the appendix has been removed. The author has reason to know that this confusion in diagnosis does occur. The diagnosis of inguinal hernia—in the presence of a bubonocle or a scrotal swelling—is a simple matter. In the absence of these landmarks a vague right iliac pain is very frequently misinterpreted. Constipation and gaseous distention may increase the pain of a beginning hernia in precisely the same fashion as it increases the pain in chronic appendicitis. One cannot exercise too much care in differentiating an incipient hernia from a symptom producing appendix. In the absence of any physical signs of hernia one must rely upon the positive signs and symptoms of chronic appendicitis. The pain of a beginning hernia is generally absent when the patient arises in the morning. Assuming that he spends most of his time in the erect posture the pain generally appears, grows persistently worse as the day progresses, only to diminish or disappear in the evening when he rests or reclines. This completes the cycle and as stated above is in the beginning the only sign or symptom of an incipient hernia.

A ureteral stone—particularly if lodged just above the brim of the pelvis—will give rise to symptoms not unlike those of chronic appendicitis. The failure to secure a complete history may easily result in a hasty diagnosis followed by an unnecessary

appendectomy and a subsequent return of the symptoms. Where there is any question as to confounding these two conditions one can safely rely upon the x ray, the cystoscope and catheterization of the ureters. These adjuncts will safeguard the diagnosis and justify the operation. Gibson's monograph on this differential point is complete and enlightening. I feel safe in making the assertion that in a vast majority of cases a ureteral calculus will produce symptoms indicating the source of the pathology. Chief among these are the following. The pain is more likely than not to be of a colicky nature, it has a tendency to radiate to the scrotum or labia and not infrequently down the thigh. It occasionally radiates to or gives rise to another pain in the loin and of course generally causes sufficient trauma to result in the appearance of red blood cells in the urine.

Other diseases of the urinary tract—particularly a movable kidney—may give rise to symptoms suggestive of chronic appendicitis. The dull ache caused by tension on the kidney pedicle and the pain caused by distention of the cecum and ascending colon due to pressure may well complicate the diagnosis. But here again the careful historian will make the fewest mistakes.

Chronic disease of the female pelvis particularly if confined to the right side may be very difficult to differentiate from chronic appendicitis. This is particularly true of a chronic recurring inflammatory pus tube. Bimanual examination disclosing a mass in the pelvis—in fixed relation to the uterus—should in most cases rule out the appendix. In pelvic disease furthermore the pain is generally just above Poupart's ligament—much lower than in chronic appendicitis. Painful and disorganized menstruation together with a history of infection when obtainable should aid in clearing the diagnosis. Chronic oophoritis and cystic degeneration of the ovary must also be excluded.

Pneumonia—particularly in children—which not infrequently simulates acute appendicitis is rarely if ever confused with the chronic form.

Deaver, Erdmann, Berg and others have reported cases of gastric hemorrhage due presumably to chronic appendicitis. A careful search of the abdominal viscera including a gastroscopy

in some cases revealed no pathology. The appendix showed the usual chronic changes and its removal was followed by a cessation of the symptoms.

The neurasthenic in his travels from physician to surgeon and back again to the physician has come to learn the symptoms of most diseases including those of chronic appendicitis. He will be able to recite with little or no difficulty a classical or semi-classical case. His choice depends upon his personal reaction to his interrogator. He is convinced that his appendix is at fault. He wants it removed and unfortunately is likely to encounter little difficulty in being satisfied—for the moment.

Syphilis—particularly the tertiary stage—may simulate chronic appendicitis. Like this latter disease it may give rise to symptoms indicative of chronic or acute change in any organ in the abdomen. Of 1000 cases of tabes dorsalis observed in a prominent clinic 10 per cent had been operated upon for supposed intra-abdominal lesion. Of this 10 per cent operated upon the three conditions designated as the cause for operation were equally divided between gastric ulcer, gall stones and appendicitis.

The history is the keystone in the diagnostic arch (Heyd). A carefully taken history, beginning as far back as the patient can remember and following through the months or years in chronologic order will often enable one to make a correct diagnosis without laying the examining hand to the abdomen. This assumption of course presupposes that the surgeon is able to interpret his findings. He would rarely remove an appendix from a neurasthenic if he had taken a careful history or from a syphilitic patient if he had taken a Wassermann or from a case of ureteral calculus if he had had the ureters catheterized or from any other of the cases mentioned if a proper study—including the use of the x-ray—had been made.

Chronic appendicitis and the operation that it entails has been mercilessly flayed each year since the technic of appendectomy has been so simplified as to reduce the mortality to  $\frac{1}{2}$  of 1 per cent. Perhaps this hounding is done in order to keep the novice out of an abdomen that a master would fear to open.

If this be true I feel that its purpose is far from being accomplished I might add that the method used to correct this evil—evil only in the hands of the unscrupulous—will only encourage more of the same ilk to make hay while the sun shines

Chronic appendicitis is then not a mental condition Nor is it the *piece de resistance* of the surgeon It is a true pathologic process brought on by an infective mechanical or congenital agency It is a symptom producing disease that requires study a differential diagnosis and surgery The operation is not an emergency one but the organ should be removed at a convenient time soon after the diagnosis is made Early removal will prevent innumerable emergency operations with their appallingly high mortality for fulminating gangrenous and perforated appendicitis Furthermore the close lymphatic association of the gall bladder stomach pancreas and appendix should be a warning of the probability of disease in the e organs should a diseased appendix be allowed to remain indefinitely



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### INTRACRANIAL TUMORS CLINICAL AND ANATOMIC OBSERVATIONS ON A GROUP OF 12 CASES OF BRAIN NEOPLASM

#### INTRODUCTION

A GROUP of highly instructive instances of intracranial neoplasms are here assembled with a view of bringing out one or more significant clinical and anatomic points of interest.

These cases have been chosen as good examples of the average type of intracranial tumors seen in an active neurologic service.

In the length of time (about one year) during which this series of cases have been collected there has passed through the Neurologic Service of the Mount Sinai Hospital a total number of 69 cases which were diagnosed as brain tumor. All of these 12 cases were verified by either biopsy or necropsy.

For convenience of description we shall group our cases on the basis of the final anatomic findings any other classification is arbitrary and artificial.

#### (A) Primary tumors of brain or its coverings

1	Glioma	1
2	Transitional gliomatous tumor	1
3	Spongoblastoma multiforme	2
4	Spongoblastoma indifferente	1
5	Acoustic nerve tumor (neurofibromata)	1
6	Pituitary adenoma	1
7	Endothelioma (meningeoma)	2

(B) Secondary (malignant metastatic) tumors of the brain or its meninges

1 M la obl st ma (p mary n th kn)	2
2 Ne blast ma (i ma, at th ad mal gl d)	1

CASE RECORDS

GROUP I GLIOMATA

Globus and Strauss<sup>1</sup> have suggested the classification of primary ectodermal neoplasms of the brain into the so called gliomata which are the more differentiated gliomatous tumors and consist of the more mature glial elements such as the astroblastomata and into the less differentiated less mature and highly cellular tumors the spongioblastomata. They have called attention to the fact that the spongioblastomata which run a more stormy clinical course and give rise to more atypical clinical features since they tend to greater diffusion more rapid growth and multiplicity of centers of growth often give rise to dissemination of signs and symptoms. On the other hand the less differentiated tumors the gliomata are made up of more differentiated more mature glial cells and are from the histologic point of view more or less benign in character are slow in growth and are restricted to isolated seats of growth and expansion. They run a slow clinical course and give rise to more circumscribed and therefore more localizing signs and symptoms. There are of course transitional and overlapping forms which cannot be submitted to a rigid classification.

The cases in group I belong to the group of the so called gliomata.

**Case I** —Cerebral symptoms of seventeen months duration. Clinical picture somewhat clouded by initial febrile state. The outstanding manifestations were headache vomiting mental changes left hemiparesis bilateral papilledema rapidly advancing course. Ventricular puncture with rapid fatal issue.

**Necropsy** — Glioma of the right temporal lobe.

**History** —H. D. female aged twelve admitted to the hospital November 2, 1925 had tonsillectomy done at age of eleven.

She was well up to seventeen months ago when she displayed some changes in personality. One year previous to admission she began to complain of intense headache in the right occipital region. The headaches would occur irregularly in repeated attacks every two or three weeks. They would last for periods of twenty four hours or more at a time and were frequently associated with unprovoked vomiting. Shortly after onset of symptoms there was noticed weakness of the left face which was soon followed by weakness of the left arm and leg. More recently she began to complain of a buzzing noise in the right ear and the attacks of vomiting became more frequent. The change in her intellectual and emotional spheres progressed gradually. She became very irritable and quarrelsome and facetious. It is said that the onset of the illness was ushered in by a mild febrile state which confined the patient to bed for a brief period of time. There is no history of double vision.

*Examination*—The patient is well developed well nourished and appears not acutely ill. The general medical examination disclosed no involvement of the cardiorenal respiratory or gastrointestinal systems. She is mentally active but highly irritable and poorly orientated for time. Her conduct is very similar to the type of conduct disorder seen in young persons following the acute phase of an attack of epidemic encephalitis. Vision is intact. Pupils are equal and react well to light and in accommodation. Ocular excursions are normal. There is no nystagmus. There is a facial weakness on the left side central in type. There is a hemiparesis on the left side with mild flexion-contractures in fingers and toes. There are no sensory disturbances. The deep reflexes are somewhat less marked on the left than on the right side. Fundus examination reveals bilateral papilledema of only 1 D. The laboratory findings are as follows: Spinal fluid under increased pressure with negative Wassermann and globulin tests and no cells. The blood Wassermann test is negative. The urine is negative.

*Course*—The case was regarded as an instance of a fronto-temporal lobe tumor with acute epidemic encephalitis as an other possibility. In order to exclude the latter a ventriculog-

raphy was suggested but the condition of the patient began to decline rapidly and stupor and urinary incontinence made their appearance. Under the circumstances operative relief was urgent if a tumor was present. Ventricular puncture on the side opposite to the site of the lesion was resorted to in order to substantiate the diagnosis of tumor. A small trephine opening was made in the left occiput and the exposed dura was found to be



Fig. 136.—Photograph of hemorrhage following trephination of the temporal bone. The specimen shows typical features of a glioma.

tense on cutting it the brain tissue bulged through the opening. A needle was introduced into the ventricle and 35 cc. of cerebrospinal fluid was removed. It was clear. Following the puncture the patient appeared to be somewhat clearer mentally but expired eight hours after the operation.

*Anatomic Findings*—Brain. In view of increased intracranial pressure large amount of cerebrospinal fluid escaping through

small opening. The right lobe shows an exceedingly large mass felt in the entire extent of temporal lobe and in the parietal lobe. On incision a mass measuring about 7 cm in length about 4 cm in width was easily shelled out from the mesial surface of temporal lobe leaving behind a smooth surface. It appeared as though the mass was resting in the descending horn of the lateral ventricle and had led to marked thinning of the temporal gyrus. The tumor itself was grayish in color, cystic and in some areas the cyst being filled with yellowish fluid. The consistency was fairly solid. The tumor on tracing back was found to encroach upon the midbrain compressing the aqueduct and causing internal hydrocephalus. The histologic picture of the tumor is uniform. The cellular makeup is abundant but is made up mainly of astrocytes (Fig. 136). There is also a great number of glial fiber structures forming in some areas dense fibrous masses. The picture is that of benign glioma of the astrocytoma type.

*Comment*—The mistake in the treatment of this case was the unjustifiable stress laid upon the diagnosis of an acute epidemic encephalitis. The history of a febrile state in the beginning and the peculiar mental attitude of the patient led to this consideration. The low grade papilledema which was present was not incompatible with this diagnosis although papilledema is a rare symptom in encephalitis and its presence should always make one hesitate in making the diagnosis of this disease. The long continued history of recurrent severe headaches with vomiting is positively incompatible with the diagnosis of encephalitis and should have made us disregard this possibility. The failure to diagnose the presence of a tumor early was the more deplorable in this case because the nature of the tumor and its location were such that it might have been successfully removed and there might have been no recurrence.

#### GROUP II TRANSITIONAL GLIOMATOUS TUMORS

As already suggested there are transitional forms of gliomatous neoplasms which do not lend themselves with any degree of certainty to a final classification. They are by their clinical course more allied to the benign gliomata though histologically

they show characteristics of the less differentiated forms of gliomatous tumors. It is difficult to label them correctly and it is best to allow them to remain undesignated for the time being.

The next case serves as a good illustration of this form of tumor cerebri.

**Case II**—Cerebral symptoms two and a half years duration development gradual. At onset there were headaches associated with vague abdominal pain which were followed rapidly by attacks of dizziness. Headaches grew progressively in intensity and the attacks of dizziness became more frequent. More recently there appeared aphasic manifestations uncinate fits and a gradual change in character. Diagnosed tumor in temporo-sphenoidal lobe. *Craniotomy* tumor not found.

**Autopsy**—Unclassified glioma of temporal lobe.

**History**—A 31 male aged twenty nine married admitted December 4 1925. Gave no history of venereal disease. Appendectomy eighteen months previous to admission. It is said that brother complains of symptoms not unlike his. Family history otherwise negative.

Patient's illness is traced back to about two and a half years prior to his admission to the hospital when he began to complain of dull pain in the abdomen associated with frontal headache and attacks of dizziness occurring as often as twenty times a day. While there were periods which were free of these vertiginous attacks there was however a progressive increase in the intensity of the headaches. With this there was noticed a gradual impairment of memory and an inability to concentrate on his tasks. Six months after the development of the initial symptoms he passed through an unusual episode. While talking to his employer he suddenly discovered that he could not find proper word to express his thoughts though he knew exactly what he wanted to say. He seemed exceedingly excited over it began to act queerly and was taken to the psychopathic ward of Bellevue Hospital for observation. Within two days the excitement subsided the mentality cleared up speech fully returned and he was allowed to go home. Since then several milder episodes occurred.

when he again experienced difficulty in finding the proper word or phrase of expression. More recently his relatives noticed in him a change of character. He became somewhat less active often appeared drowsy and would yawn frequently. Twelve days before entering the hospital there occurred a sudden change. An intense headache ushered in by a chill developed. At this time the headache continued uninterruptedly. It is noteworthy that at no time during his illness were there any convulsive attacks, no occurrences of projected vomiting but the patient described the occurrence of uncinate attacks. He has on several occasions detected unusual odors though a search for their source failed to disclose anything responsible for them.

**Examination**—There is percussion tenderness in the left frontotemporal region. The pupils are unequal the right larger than the left both react to light and accommodation. Early bilateral papilledema is present. Ocular movements are normal. The motor and sensory distribution of the fifth nerve is normal. There is a mild right facial weakness central in type. Hearing is intact. Slight deviation of the tongue to the right and normal palate innervation. Paresis of the right upper extremity with slight ataxia, asynergia and adiakokinesis of the same side. All deep reflexes are hyperactive on the right side. There is a right equivocal plantar and an inexhaustible ankle clonus on the same side. Gait is unsteady with a tendency to fall to the right and there is a loss of associated movement on the right side. Neuro otologic examination evidenced nothing more than that found in increased intracranial pressure.

A mental examination revealed the following. There is no emotional disturbance. Orientation for time and place is intact. Patient has difficulty in recalling more complete names of objects but there is no apparent memory defect noted. There is a marked disturbance of speech. He understands spoken language carries out spoken and written commands promptly, picks out objects named, names objects shown, reads print correctly but can not retain what he has read. Spontaneous speech is fluent except that there is a noticeable groping for words. He hesitates when asked to repeat a long phrase or several numerals.

The laboratory findings are negative blood and urine having been examined several times. No lumbar puncture was done.

*Course*—The diagnosis of a cerebral neoplasm on the inferior surface of the left temporo-phenoidal lobe at its anterior end was made. The patient's condition demanded immediate surgical intervention and under local anesthesia a craniotomy was done. The brain surface was palpated and the under surface of the left temporal lobe was felt. No surface tumor was detected.



Fig. 137.—Photograph showing the gross appearance of the tumor in Case II (a large, infiltrating tumor in the left temporal lobe).

A needle was introduced to a considerable depth without meeting definite resistance. Thus no removable lesion was found by the surgeon. Following the operation the condition of the patient declined very rapidly, breathing becoming stuporous, pulse poor in quality, and he died the day following the operation.

*Anatomic Findings*—The tumor is definitely limited to the temporal lobe (Fig. 131) involving mainly the ventral surface and the inferior temporal gyrus in their entire length. It compresses the third ventricle, the ipsilateral part of the anterior horn and

body of the lateral ventricle. The other half of the lateral ventricle and both posterior horns are dilated.

Section shows a highly cellular tumor the cells of which are lymphoid in character with large deeply staining nuclei surrounded by meager amount of cytoplasm. Throughout the microscopic field the cells take an alveolar arrangement giving the appearance of an arrangement commonly seen in neuroblastoma. The tumor could be classed with the neuroblastomata but since it is most probably primary in the brain and does not possess all of the characteristics of neuroblastomata it would be best to allow it to remain unclassified and group it with the transitional gliomatous tumors.

*Comment*—Little need be said here in comment on this case. The diagnosis of tumor was made and it was correctly localized as later verified by autopsy. The uncinate fits the aphasic manifestations the right hemiparesis (incomplete) loss of associated movements on the right side with ataxia and adiakokine is on the same side in the presence of manifestations of increased intracranial tension (papilledema headache etc.) pointed definitely in the direction of a neoplasm in the anterior portion of the left temporal lobe. The failure to recognize the presence of a tumor at the operation robbed the patient of a possible chance for cure and recovery through successful removal of a relatively benign growth.

### GROUP III SPONGIOBLASTOMATA MULTIFORME

In our third group there are two verified instances of spongioblastomata multiforme. The similarity in the clinical course of the 2 cases permits of their common grouping and the morphologic feature in the 2 verified cases mark them as malignant primary gliomatous tumors which we have already referred to as spongioblastoma. The latter to quote from a previous publication<sup>1</sup> are characterized by the following morphologic and clinical feature. They are highly cellular their cells are embryonal incompletely differentiated glial elements—the spongioblasts. These cells are found in several transitional forms such as the giant cell the pyriform cell and an irregular stellate cell.

These cells particularly the giant cells frequently undergo amitotic division although mitotic figures are occasionally encountered. They show marked proliferative tendencies. The cells in their grouping assume various rudimentary formations alveolar, radial (about cyst like structures), palisadal and other extensive necrotic zones, numerous hemorrhagic foci and cystic degenerative changes are common. Grossly such tumors may be recognized by their granular appearance, marked vascularity which gives them a dark, dirty, brownish red hue, by extensive necrotic areas, marked edema of a wide zone of the neighboring tissue and occasionally by the multiplicity of growth centers.

This form of cerebral neoplasm is also generally characterized by an unusual clinical picture which is marked by acute onset, rapid clinical course and early fatal termination. Because of the atypical clinical features which simulate either an inflammatory or vascular disease of the brain early diagnosis is exceedingly difficult and often impossible. This form of tumor is occasionally associated with tuberous sclerosis, a form of diffuse spongioblastosis. Such neoplasms are often described under various other names and are frequently called gliosarcoma, a term which we consider as incorrect.

The above anatomic and clinical features are exemplified by the following 2 cases.

**Case III** — This patient had a previous admission to the hospital. He then presented a clinical picture which was characterized by the sudden and very abrupt onset of cerebral manifestations such as syncope, meningeal irritation and the presence of non traumatic blood in the cerebrospinal fluid. It was thought that a ruptured aneurysm of a cerebral artery at the base of the brain could easily account for the train of events and objective findings. The subsequent and the rather rapid recovery made by the patient served as further evidence in support of such a diagnosis.

However a recent recurrence of grave cerebral involvement with the appearance of a new and somewhat different set of general and more localizing signs and symptoms such as evi-

dence of marked increased intracranial pressure frank bilateral papilledema left homonymous hemianopsia and disturbance of gait and station demanded of course a thorough revaluation of all the clinical features with a view to a better recognition of the character of the lesion and its more accurate localization

*History* —P Z a tailor aged forty one and married was admitted to the hospital for the first time on August 15 1925 the third day of an acute illness His family history was negative In his personal history we find one fact of rather doubtful significance that seven and a half years ago he had some ear condition the character of which cannot be fully established but which it is said was not associated with any discharge from the ear, and another fact seemingly of greater importance is that four and a half years ago he suddenly fell and lost consciousness He apparently recovered rapidly though he was forced to remain in bed for several days This attack of syncope was for no good reason attributed to his ear condition Aside from those two short periods of illness he was always well He was always regarded as a rather unusually irritable quarrelsome and quick tempered man

Three days prior to his first admission to the hospital while sitting at the door of his store he was suddenly seized with an attack of vomiting He vomited repeatedly on that day and several times on the following day With this there developed intense headache marked rigidity of the neck general weakness unsteadiness of hands a slow speech and a slight rise in temperature (100 -101.5 F) While there was no definite paralysis in any of his extremities he was nevertheless unable to walk or sit up There was no double vision Examination on first admission revealed a markedly emaciated man acutely ill and in semistupor He could however be easily aroused and made to answer questions There was no marked slowing of intellect His pupils were regular but unequal the left larger than the right they reacted well to light and reacted apparently also in accommodation The extrinsic ocular mechanism could not be tested for lack of cooperation The disks showed indistinct margins and were regarded by the resident staff as showing early

papilledema. The ophthalmologists however found no elevation and reported moderately dilated veins with narrow and tortuous arteries. There was marked rigidity of the neck with bilateral Kernig, a slight facial weakness and hyperactive deep reflexes more marked on the right side. The pulse was slow (60). The temperature was somewhat elevated. A lumbar puncture yielded dark brown, apparently bloody fluid not traumatic in character. A centrifuged specimen of the fluid showed numerous broken down red blood cells and a few polymorphonuclear leukocytes. The blood pressure was 95/50, white blood count 19,000 with 84 per cent of polymorphonuclear leukocytes. The Wassermann tests of blood and spinal fluid were negative. No tubercle bacilli were found in the spinal fluid.

On the second day of his residence in the hospital the patient suddenly developed a convulsive attack which was ushered in with labored stertorous breathing. His eyes rolled with a tendency toward conjugate deviation to the left. The pupils were dilated and fixed. The arms and legs were extended and fixed in the position of so called decerebrate rigidity. They relaxed for a short period of time to become rigid once more. The deep reflexes were hyperactive and there was bilateral ankle clonus. There was no Babinski sign and no Magnus and DeKlijne phenomena. He came out of his attack regaining consciousness gradually. His third day in the hospital was marked by some general improvement and with better cooperation the following additional observations were made. On sitting up the patient showed a marked tremor of the head. The head was inclined to the right and the chin was carried to the left. The right upper extremity showed dysdiadochokinesis, the left some dysynergia while both lower extremities showed slight ataxia more marked on the right side. There was no headache and dizziness occurred only when he attempted to sit up.

Neuro-otologic examination showed spontaneous nystagmus to the right in the extreme lateral position past pointing inward with the left hand. Stimulation of all canals gave normal nystagmus. The inward past pointing with the left hand was not overcome by the stimulation of the left canals. Stimulation of

the right horizontal canal gave an abnormal reaction in the nature of inconstant past pointing. The latter condition and the normal nystagmus pointed in the opinion of the otologist to a bilateral intracerebellar lesion.

The diagnosis of the neurologist at this time rested between meningoencephalitis and intracranial aneurysm.

The patient continued to improve. Another lumbar puncture on September 23, 1925 yielded clear fluid under slightly increased pressure. There were a few scattered red blood cells and 15 lymphocytes per cubic millimeter.

At the end of two months his condition improved sufficiently to permit his discharge from the hospital with the diagnosis of aneurysm of a cerebral artery at the base of the brain with bleeding into the subarachnoid space.

At home his condition apparently remained unchanged for about six weeks but three weeks ago two weeks prior to his readmission he began to complain again of intense headache, dizziness and impaired vision. He began to vomit, developed an unsteady gait falling to the left and experienced weakness in the left arm and leg.

He was readmitted to the hospital December 31, 1925 and on examination showed the following positive findings: (1) Slight clouding of intellect with a superficial emotional reaction. (2) Unequal pupils, the left larger than the right, the latter reacting poorly to light and in accommodation. (3) A few nystagmoid twitchings to the right. (4) Bilateral papilledema. (5) Left homonymous hemianopsia. (6) Diminished corneal reflexes. (7) Mild left central facial weakness. (8) Mild left hemiparesis. (9) Hyperactivity of the deep reflexes, the left being livelier than the right. (10) Less active abdominal reflexes on the left. (11) Bilateral equivocal plantar reflexes. (12) Slight ataxia in all four extremities with cerebellar form of hand on the left side. (13) Unsteady gait with tendency to fall to the left and backward (retropulsion). (14) Head in cerebellar tilt to the right and chin carried to the left. (15) Mild astereognosis and slight disturbance in joint sense on the left side. He recognizes objects better in the right hand. (16) The cerebrospinal

fluid under slightly increased pressure but clear and containing no cells (17) Hearing reported by otologists as normal (18) Caloric tests carried out by the resident staff showed that the left horizontal and vertical canals gave normal responses and that the right horizontal and the vertical canal gave diminished responses

*Course* --- The patient during the first ten days in the hospital showed fairly constant headache increased frequency of vomiting and gradual decline in the mental capacity but no apparent change in other objective findings. In attempting to arrive at a diagnosis the seat of the lesion was placed on the under surface of the brain supratentorially in the region of the right temporo occipital lobe. Such a localization explained most of the focal signs such as the left homonymous hemianopsia the mild paretic phenomena on the left side and some of the cerebellar features as well as the internal hydrocephalus with its manifestations of increased intracranial tension.

Manifestation of progressively increasing intracranial pressure and the presence of signs localizing with fair accuracy the seat of the lesion demanded operative interference. It was however decided to do a ventriculography before operating. While awaiting the operation the patient suddenly passed through an unusual episode. He first became very emotional and restless waving his right arm and carrying it toward the occiput his left arm became flexed and spastic and his left leg became extended and spastic. His eyes were in partial conjugate deviation to the right. There appeared bilateral Babinski sign and bilateral ankle clonus more marked on the left side. This episode lasted ten minutes and was not associated with complete loss of consciousness though the patient was somewhat dazed. Following the attack the Babinski sign and the clonus disappeared. On the following day shortly before operation a similar episode of shorter duration took place.

On January 15th a left ventricular puncture was carried out. The cerebrospinal fluid was found slightly blood tinged and under increased pressure. No other unusual observations were made. The patient was returned to the ward in good condition but

soon after there was noted a progressive mental deterioration with progressive elevation of the disks. The patient died suddenly two days after the ventricular puncture.

*Anatomic Findings*—Brain. Shows evidence of increased intracranial pressure. There is no evidence on gross inspection



Fig. 138—Photograph showing gross appearance and location of tumor in Case III (Spongioblastoma multiforme)

of meningitis or of free blood on the surface of the brain. The tonsils of the cerebellum are prominent and give the impression of having been wedged into the foramen magnum. The pia arachnoid in this region is somewhat thickened and shows bluish discoloration. On section a large tumor mass is found on the under surface of the right temporo-occipital lobes (Fig. 138). The

tumor measures approximately 7 by 4 cm on cross section. It is located entirely posterior to the thalamus and lies medial to the optic radiation. It has broken through to the surface on the mesial side of the right occipital lobe and dislodged somewhat the mesencephalon to the opposite side compressing the brain stem in the region of the quadrigeminate plate. The aqueduct of Sylvius is represented by an oblique slit. The tumor is exceedingly friable dark brown in color highly vascular hemorrhagic and granular in appearance. The tumor extended mesially in the region of the forceps major invading the left occipital lobe in that region. It has broken into the posterior horn of the left lateral ventricle through the mesial wall which is invaded by tumor tissues. In addition to the main tumor mass there are several additional independent centers of growth located in the anterior part of the left occipital lobe. The ventricles are deflected to the left side and the posterior part of the left ventricle is collapsed.

The tumor is very cellular markedly vascular and has all the characteristics of the type which we have described under the name spongioblastoma multiforme.

*Comment*—On the first admission the neurologists were confronted with the difficult task of establishing not only the character of the cerebral lesion but also its location. The history and all the clinical signs indicated the probability of a ruptured aneurysm. However on the second admission of the patient it could be said that the lesion was in the nature of a tumor either aneurysmal or neoplastic which lay on the under surface of the brain and affected the right optic pathway and the brain stem. In determining the character of the tumor a somewhat more difficult situation was encountered.

In support of the diagnosis of an intracranial aneurysm the following diagnostic points common to such lesion and which are prominent in our case are as follows: (a) Sudden loss of consciousness without prodromal symptoms (b) repeated attacks of syncope associated with generalized convulsions or other cerebral manifestations (c) signs of meningeal irritation (d) blood in the cerebrospinal fluid (e) rise of temperature (f) re-

missions over variable time periods (g) increased gravity of the clinical picture with each succeeding attack (h) other constitutional defects such as atherosclerosis cardiac disease nephritis and muscular dyscrasia

The hesitation to decide in favor of a much suspected intracranial aneurysm will be readily understood if we recall an important statement made by Beadles in a lecture before the Royal College of Surgeons where he discussed the symptomatology of aneurysms of cerebral vessels. His remarks were based on a study of 555 cases of cerebral artery aneurysms verified by autopsy findings. A large number of those reported were of course gathered from the literature. He said: Notwithstanding the remarks made by some who have specially written on intracranial aneurysms and the writers of some of our leading text books the conclusion that I have been forced to draw from a large series of cases carefully studied is that it is quite impossible to diagnose an aneurysm of any of the cerebral arteries except in the most unusual circumstances. Only 2 or 3 cases have ever been diagnosed during life. And though we have mobilized all the available facts in support of aneurysmal form of tumor we were nevertheless well aware of a statement made by another English investigator. Though it was written as long ago as 1859 it has lost little of its significance. It was Gull who said: Although we may from circumstances sometimes suspect an intracranial aneurysm we have at best no symptoms upon which to found more than a probable diagnosis. And since a tumor derived from the meninges in the location indicated could give rise to all the neurologic manifestations the latter form of lesion was seriously considered.

Case IV -- Cerebral symptoms of two years duration ushered in by severe recurring headaches and followed by repeated temporary paretic and aphasic attacks. At first no clear cut evidence of increased intracranial tension more recently rapidly advancing course with more definite focalizing signs directly before death.

Autopsy -- Spongioblastoma in left cerebral hemisphere

*History*—H. W. female aged forty seven admitted November 16 1925. One sister insane. Family history otherwise negative. Aside from diseases of infancy patient was well until the recent illness. No history of miscarriages. Three children living and well, two died in infancy. Menopause at the age of forty.

Her present illness dates back to two years ago when she began to complain of occasional intense headache and gradual blurring of vision. Her headache became more frequent occurring as often as two to three times a week for the past several months. Six weeks previous to admission she suddenly lost her balance and fell to the street. There was no loss of consciousness and no serious injury. One week later while washing she became dizzy and fell to the floor. Six days prior to her entrance to the hospital she suddenly lost her power of speech for a few minutes and was unable to answer questions. These attacks recurred in more aggravated form. Thus one day her inability to speak lasted the entire day. At that time she suffered with repeated attacks of unprovoked vomiting. She took to bed and three days before admission she became temporarily deaf. A day before entering the hospital she became semicomatose and disoriented in the semilucid interval. At no time were there any convulsions, sensory disturbances or changes in personality prior to the onset of her semistuporous state.

*Examination*—Patient is fairly well nourished and afebrile. There is no rigidity of the neck and no skull tenderness. Heart slightly enlarged to the left. Blood pressure 110/85. Lungs are clear. Abdomen soft and free from palpable masses. She is confused and emotionally unstable. Spontaneous speech is slow and at times incoherent. There is a tendency toward perseveration. She carries out some simple commands but apparently does not understand most of them. She does not understand written questions and cannot carry out written commands. She copies writing mechanically without understanding its nature. She reads a newspaper without regard to column arrangement mixing unrelated facts. Cannot repeat what she has read. Cannot name objects shown to her.

Pupils are unequal left greater than right both are irregular but react to light and in accommodation there is questionable bilateral external rectus weakness and bilateral corneal hypes thesia more marked on the right side Hearing is apparently intact Tongue and pharyngeal movements are intact There is slight weakness and slight clumsiness of the right upper extremity slight increase of the right biceps triceps and radial reflexes All abdominal reflexes are diminished but equal Right knee and Achilles jerks are somewhat greater than the left but there



Fig 139.—Photomicrograph showing histologic appearance of spongiosis multiforme in Case IV Note the giant multinuclear cells

is no clonus and no Babinski sign The fundi are negative There are no apparent sensory disturbances The cerebrospinal fluid is under normal pressure with 5 lymphocytes per cubic millimeter and no globulin The Wassermann test in the blood and spinal fluid are negative The urine is negative

*Course*—The patient's stay in the hospital was marked by a progressive decline and the appearance of additional signs There developed a few days after her admission a definite right facial paresis central in type a Babinski sign on the right side spasticity and clonus of the right leg

At this time the diagnosis of cerebral neoplasm was regarded as certain and operative interference was considered advisable but on the fourteenth day of the patient's stay in the hospital she became stuporous and twitchings developed in fingers and muscle of the right forearm. There was further rapid decline and death occurred on the seventeenth day of her stay without surgical interference.

*Necropsy Findings*—Small fragments of brain tissue were removed through a small trephine opening in the left precentral region. The majority of these fragments when studied microscopically showed tumor tissue with the histologic appearance of spongioblastoma multiforme (Fig. 139).

*Comment*—In view of the rather protracted course and the absence of cardiovascular or malignant disease the diagnosis of a primary cerebral neoplasm in the left hemisphere was regarded as the most probable though the repeated attacks monoplegic in character were considered to be favoring the vascular nature of the disease. The absence of cortical seizures in the form of convulsions or fibrillations coupled with a transcortical form of aphasia placed the lesion in the subcortical region of the frontotemporal lobes on the left side. The progression of symptoms and signs indicated an advancing growth spreading into the motor area of the brain as shown by appearance of pyramidal tract signs in the right lower extremity. The very rapidity with which the clinical manifestations unfolded themselves held out little promise for successful surgical interference.

#### GROUP IV SPONGIOBLASTOMA INDIFFERENTIALE

In our fourth group we have one case of a still less differentiated gliomatous neoplasm for which Cushing in accord with us suggested the name of *spongioblastoma indiffereniale*. Since this type of tumor is composed of cells more nearly like the embryonal spongioblast it is probably more malignant than the spongioblastoma multiforme more rapid in its rate of growth and consequently causes a more hasty development of clinical symptoms.

**Case V**—Cerebral manifestations of ten weeks duration An acute onset of signs of increased intracranial pressure nausea vomiting dizziness and visual disturbances Rapidly progressive course with development of meningeal signs mild papille dema and cerebellar disturbances Ventricular puncture subdural hemorrhage sudden death

*Necropsy*—Spongioblastoma infiltrating pons

*History*—W W male aged twenty five married was admitted June 22 1925 In his past history as well as in his family history there were no facts bearing upon his terminal illness He was well up to eight weeks previous to admission when he suddenly began to suffer with severe headache The pain would radiate from the occiput to the parietal region At the same time he began to vomit frequently and soon after he began to complain of vertiginous attacks which were more marked on arising He was seen by a physician and his condition was first regarded as being due to some gastro intestinal disturbance Two weeks after the onset his vomiting became more frequent it was unprovoked and projectile in character On the third week of his illness he developed double vision The vomiting and intense headache continued and he lost weight rapidly He was sent to a local hospital and there he was seen by one of us who expressed the following opinion The clinical history and objective findings point to a posterior fossa neoplasm probably infiltrating on the left side The opinion was based on the following findings Bilateral early papilledema vertical nystagmus also horizontal nystagmus more marked to the left Weakness of the left external rectus Cerebellar tilt of the head and staggering gait with tendency to fall to the left It was suggested that the patient be transferred to another institution where he would be within reach of a competent neurosurgeon He was then transferred to Mount Sinai Hospital On admission his examination showed the following Patient is exceedingly weak unable to walk Slight tremor of both hands in finger to nose test Slight tremor of outstretched hands Deep reflexes more active on the right throughout No pathologic reflexes Slight rigidity of the neck Few nystagmoid jerks on upward gaze

Slight bilateral ptosis and exophthalmus. Slight right facial flattening. Lumbar puncture slightly increased pressure. Xanthochromic fluid.

*Course*—The diagnostic possibilities suggested at that time were tuberculous meningitis because of the rapid evolution of the clinical course and the absence of frank papilledema a neoplasm in the third ventricle hemorrhagic leptomeningitis and lues. The patient's stay in the hospital was marked by progressive and very rapid decline. He became more stuporous, swelling of the disks became more definite and the fundi showed hemorrhagic foci. A ventricular puncture was regarded as imperative for a localization of lesion. Following an unsuccessful puncture the patient went suddenly into stupor and rapidly developed signs of left hemiparesis with bilateral Babinski sign. It was thought that the patient was bleeding into the ventricle and on introduction of the needle bloody fluid was obtained. He failed to regain consciousness and died within a few hours after ventricular puncture.

*Anatomic Findings*—Brain. There is moderate hemorrhagic infiltration of the calp in the region of the operative field. On removing a portion of the posterior part of the calvarium an extensive extradural hemorrhage on the right side of the skull is seen. About 250 c.c. of freshly clotted blood is present in this region. On incising the dura a small amount of blood is found beneath it in the region of the operative field. The surface of the right hemisphere is considerably indented by the pressure of the extradural clot.

On removal of the brain evidence of moderately increased intracranial pressure is seen. There is no evidence of inflammation or hemorrhage in the subarachnoid space. The ependymal lining of the posterior horn of the left lateral ventricle appears to be stripped leaving behind an irregular granular appearance.

The lateral ventricle and aqueduct appear to be normal in shape and size and there is no intraventricular hemorrhage. The fourth ventricle appears to be collapsed forming a narrow transverse line surrounded by a narrow zone of granular material which is grayish in color and neoplastic in character (Fig.

140) This narrowing of the fourth ventricle is noted in its anterior pontine portion while the posterior half is apparently free of such change. The middle cerebellar peduncles particularly the right show in their median portion a certain amount of softening. The tegmentum and base of the pons proper do not show any gross change aside from a certain amount of discoloration in its right half.



Fig. 140.—Photomicrograph showing the tumor growth in the floor of the fourth ventricle. Note the high cellularity of the neoplasm and its invasive character (Case V) ( $\times 30$ )

The microscopic examination of the growth shows it to be highly cellular and very vascular. The cells many of which are of multinuclear giant type are little differentiated and are most likely early spongioblasts. The histologic picture places the tumor among the so called spongioblastoma indifferente (Fig. 141).

*Comment*—A review of the various diagnostic opinions expressed by a number of observers during the rather short illness of the patient reveals a rather large assortment. It was first thought that the vomiting and vertigo were due to some gastrointestinal disturbance and therapy was directed to that end. It soon became apparent that the uncontrollable vomiting, the increase in vertigo, the rapid loss of weight and unsteady



Fig. 141.—Photomicrograph showing cells making up the plasma cells. Note the giant multinucleated cell in the center (X 1500).

gait were manifestations of a serious cerebral disease. When first seen by a neurologist the tentative diagnosis of a pontine neoplasm, the latter being of an infiltrating and malignant variety was made.

He was then placed in the care of other observer and the presence of some not clearly localizable signs led them into the error of considering the condition as a form of meningitis. The

presence of xanthochromic cerebrospinal fluid added to their difficulty so that a hemorrhagic form of meningoencephalitis was seriously considered. As a remote possibility they suggested a neoplasm in the third ventricle.

By analysis of the clinical manifestations and their unfolding it becomes clear why the first diagnosis of a positive malignant neoplasm should not have been abandoned. The intense head ache unrelieved by any form of medication, the projectile vomiting not controlled by medication, the increased intracranial tension as noted on lumbar puncture, the development of fairly localizable objective neurologic signs slight though they were, and the appearance of papilledema were unmistakable signs of intracranial tumor.

Its location was disclosed by the ventrical nystagmus which pointed to a stem lesion while cerebellar manifestations placed it in the pons. The acute onset, the rapid course and its very localization indicated the malignancy of the tumor.

#### GROUP V NEUROMATA

This form of cerebral neoplasm is most commonly found in the pontofacial angle and presents a rather characteristic series of signs and symptoms. Cushing's classic monograph on Acoustic Nerve Tumors includes a description of the common as well as of the many unusual forms.

**Case VI**—Bilateral acoustic nerve neuromata. Preoperative diagnosis. Either multiple cerebellopontine angle tumor or a diffuse basilar meningeal process inflammatory or neoplastic. Clinical manifestations. Bilateral deafness, bilateral loss of vestibular function rapidly advancing papilledema with optic atrophy and blindness with little evidence of brain stem compression and practically no symptoms of increased intracranial tension. Suboccipital decompression in two stages. Death during second stage of operation.

**History**—A S aged thirty three married admitted January 11, 1926. Family and personal history negative. She had no miscarriages or stillbirths. Two years prior to her admission

to the hospital she noticed that hearing in her left ear had become somewhat impaired. This deafness progressed gradually and steadily so that she recently became almost deaf in her right ear. Along with this gradual loss of hearing there has developed a progressive disturbance in gait so that of late the latter became staggering with a marked tendency to fall alternately to one or the other side. On standing still however she remained erect and did not fall. Four weeks before entering the hospital and shortly after giving birth to a child she noticed that her vision began to fail. When reading she was in need of turning her head to one side to a rather awkward position in order to see more clearly. One week later she began to complain of pain and of a feeling of numbness on the left side of the face. This was associated with an occasional mild headache. At no time were there any convulsions, tremors, unsteadiness of head and arms or loss of power in any extremity. Her speech remained intact. There was no double vision and no febrile state.

*Examination*—Patient is well nourished and well developed. She complains of tic like pains in the face. There is rather an overabundance of hair on the face. The gait is on a broad base, staggering with tendency to fall to the right though she also sways quite often to the left. The head is tilted to the left with the chin carried to the right. The right pupil is irregular in outline both pupils react in accommodation. There is nystagmus in both horizontal planes more marked on looking to the left with the quick component to the right. There is also vertical nystagmus and a tendency to show deviation. The fundi show bilateral papilledema (O.D. and O.S. 3 D.) with fairly marked secondary optic atrophy. The visual acuity is markedly diminished right is 14-200 the left 20-70. The fields of vision are contracted. There is definite involvement of the sensory branch of the fifth nerve on the left side with hypalgesia, hypesthesia and thermohypesthesia in the distribution of its lower branches also corneal anesthesia on the same side. There is also apparent weakness of the motor branch of the fifth and a left facial paresis. However electrical reactions of the muscles of the face are normal. There is bilateral complete deafness.

with loss of labyrinthian responses on both sides to the caloric and turning tests. There is slight clumsiness in the finer movement of the left hand (dysdiadokokinesis). All deep reflexes are equal and active. The right abdominal reflexes are not elicited, the left are diminished. The abdomen however is lax due to the recent pregnancy. Cerebrospinal fluid is under normal pressure containing 6 cells with positive globulin and negative Wassermann tests. The blood Wassermann test is also negative. A Ray examination of the skull shows an enlarged sella turcica with a suggestion of erosion at its base.

*Course*—It was quite obvious from the above findings that a neoplastic process in the posterior fossa was responsible for the clinical manifestations in the case, but the unusual combination of bilateral deafness and bilateral vestibular nerve impairment raised the question as to whether we were dealing here with a single large compressing unilateral lesion or were there two or more bilaterally located lesions such as small neoplasms in each cerebellopontine angle. With this in mind and because of the advancing optic atrophy with blindness, a suboccipital craniotomy was advised. In the course of the operation the dura over the left cerebellar lobe was exposed and found plum colored. At the same time the right ventricle was punctured and 40 to 50 cc of cerebrospinal fluid was removed under increased pressure. On the following day the right lateral ventricle was punctured to reduce intracranial tension and the dura in the suboccipital region was then opened and there was a marked prolapse of both cerebellar lobes. An attempt to reduce pressure by further withdrawal of fluid was unsuccessful and the patient died before completion of the second stage of the operation.

*Necropsy Findings*—Brain shows evidence of only slightly increased intracranial pressure. The base of the brain shows marked distortion and displacement of structures. The tuber cinereum is thin and blown up and the pons is displaced somewhat to the right and narrowed particularly on the left side. A large globular and nodular mass well encapsulated and freely movable is found on the left side excavating and displacing downward the left cerebellar hemisphere compressing and displac-

ing the pons to the right (Fig 142). On the right side a smaller mass measuring about 3 cm in diameter also globular nodular easily displaceable not attached to any cranial nerves is found in the pontofacial angle. It has led to only slight depression in adjacent structures. The cranial nerves showed the effect of pressure as follows. The fifth is markedly flattened on both sides but more so on the left side. The sixth is flattened especially



Fig 142.—Photograph showing gross appearance of the fifth cranial nerve on the left side. The fifth nerve is flattened in the pontofacial angle. The seventh nerve is flattened on the right side. The eighth nerve is almost completely obliterated and replaced by soft tissue on the left side, but is present but softened and flattened on the right. On section only a moderate symmetric internal hydrocephalus is seen. Diagnosis: Bilateral acoustic neuromata.

on the left. The seventh is normal on the right side but flattened on the left side. The eighth nerve is almost completely obliterated and replaced by soft tissue on the left side, but is present but softened and flattened on the right. On section only a moderate symmetric internal hydrocephalus is seen. Diagnosis: Bilateral acoustic neuromata.

**Microscopic**—Sections of the tumors present a uniform

histologic picture. A number of nerve tracts in various degrees of preservation are surrounded by cellular masses of undifferentiated elongated glial cells. The latter are arranged in streaming cords or in whorls and are in a loose syncytial like structure. There are fairly large numbers of blood sinuses.

**Diagnosis** Glioma of peripheral nerve (Schwann cell membrane in origin—acoustic neuroma)

**Comment**—Returning once more to the discussion of the diagnostic possibilities in this case let us bear in mind the fact which is not stressed enough in the clinical history that the patient has had but an occasional mild headache and at no time did she have attacks of vomiting. It is also noteworthy that she recently went through an uneventful pregnancy. On the ward she gave the impression of being quite comfortable except for attacks of trigeminal irritation which annoyed her quite frequently. The first diagnostic possibility considered in this instance was that of a left cerebellopontine angle tumor but in view of the bilaterality of signs and particularly the bilateral deafness with the lack of discrete pyramidal tract involvement this could not be regarded in the light of a final diagnosis. Indeed were the lesion in the nature of a single angle tumor large enough to produce marked papilledema, optic atrophy and bilateral acoustic nerve involvement it would be most unusual for such a growth to have produced so little in the way of general symptoms of increased intracranial pressure *e.g.* headache, vomiting and to have so completely spared the pyramidal tracts and so lightly involved the cerebellar system.

Cushing in his classic monograph on angle tumors reports 5 cases in which bilateral (though variable in degree) involvement of the eighth nerve was found associated with verified unilateral angle tumors. In one case (Case 16 of his series) there was constant bilateral tinnitus with complete deafness and loss of vestibular function on the left side. This was a case of a left acoustic nerve tumor with a characteristic pontocerebellar syndrome. In another case (Case 20) a right acoustic nerve tumor showed complete right deafness, loss of all responses to caloric tests on the right side and diminished vestibular activity.

on the left side. This is the classical symptom complex in reference to the acoustic nerve presented by these tumors. In a third case (Case 24) of Cushing's group a right acoustic tumor with advanced cerebellopontine angle syndrome with absolute deafness on the right side showed also partial deafness on the contralateral side. Case 27 of his group a verified left acoustic nerve tumor displayed bilateral tinnitus more marked on the left than right side with complete deafness on the left side.

Of still greater interest because of some points of similarity to ours is Case 30 of his series of verified tumors. The patient a woman thirty seven years of age began to display soon after marriage an unsteadiness of gait. Her husband noticed at the same time that her speech became somewhat thick and there appeared an immobility of face with drooling of saliva. These manifestations were thought to be accidental to her pregnancy. There was little further change in her condition until six weeks prior to her expected confinement. About that time she awoke one morning complaining of numbness in both sides of her tongue and face. She was also unable to walk because of marked staggering. Shortly after she noticed impairment of hearing on the left side. A cesarean section was performed. She soon began to complain of double and blurred vision of mild headache and of taste disturbances. An examination by a physician revealed anosmia, papilledema, bilateral facial paresis, bilateral external rectus weakness, diarthria, deviation of tongue to the right, loss of sensation over entire face, static ataxia with falling to either side or forward, incoordination of the extremities especially of the left leg. This dissemination of symptoms suggested the diagnosis of a diffuse disease process and polyneuritis or polyneuritis were considered. The clinical picture continued to unfold and very soon the deafness in the right ear became more pronounced and then with surprising abruptness hearing was completely lost. With similar suddenness she became completely blind. There soon developed paralysis of the muscles of mastication and more recently she passed through several episodes of a so called cerebellar convulsive seizure. With this it should be recalled headaches mild in character

and moderate vomiting occurred but occasionally. At a later date Dr Cushing's examination of the patient disclosed Bilateral secondary optic atrophy bilateral total blindness fixed to light pupils complete anosmia enlarged sella turcica cervical rigidity and tenderness a few nystagmoid jerks to the right marked ataxia in all extremities during purposeful movements gait on broad base (with support) generalized hyperreflexia no clonus and but questionable Babinski signs complete bilateral external ophthalmoplegia bilateral loss of corneal reflexes bilateral hypesthesia in distribution of the fifth nerve (total anesthesia on the right) complete bilateral paralysis of muscles of mastication almost complete bilateral facial palsy marked dysarthria and dysphagia complete bilateral deafness and loss of labyrinthian responses Cushing at first regarded this case as an instance of bilateral angular tumor but the necropsy showed a single left acoustic tumor In commenting on this case Cushing says that it was difficult to see while observing the patient how any other than a bilateral acoustic tumor could possibly have accounted for all the symptoms in the case

This remarkable case certainly has a direct bearing on the clinical picture of our patient as it illustrates how wide spread and multiple in distribution may be the signs produced by a single one sided tumor in this location It will be recalled however that in but one of the cases presented by Cushing in which bilaterality of symptoms were present was there a condition such as complete bilateral total loss of function in both divisions of the eighth nerve as in our case and in that one case there was marked compression of the stem This is significant for it is hard to conceive of a single lesion accomplishing complete interruption in the conduction in both nerves with so little evidence of brain stem compression as in our case

Multiple tumor formation associated with general neurofibromatosis (Von Recklinghausen) was also considered but in the absence of any evidence such as pigmentation or suspicious elevations in the skin it could not be regarded in the same light as a possible multiplicity of tumors unassociated with generalized neurofibromatosis Such a diagnosis Cushing says has never

been correctly made antemortem but that should not exclude a serious consideration of a bilateral independent tumor formation in the two pontofacial angles particularly in the presence of bilateral total deafness for as Cushing says A localizing diagnosis however must rest on deafness which far outweighs all other extracerebellar symptoms in its importance and the diagnosis of a bilateral process can with safety only be made when there is bilateral deafness (Not to full exclusion of a single lesion—see Case 30 of Cushing's group) Basilar meningitis and sarcomata of the meninge are two conditions which were discussed mainly in view of the absence of a history of tinnitus which is an early angle tumor sign However the absence of meningeal signs and the negative spinal fluid tests especially the absence of cellular elements led us to consider either of the 2 lesions most unlikely though not impossible

#### GROUP VI ENDOTHELIOMATA

In this group we have 2 cases with the tumors localized and operated upon successfully

Dr Cushing<sup>2</sup> has shown that these tumors are derived from embryonal rests of the meninx and hence are best named meningioma They also like other neoplasms present a variability in histologic make up On one hand they may resemble the histologic picture of a sarcoma and on the other hand appear as dense innocent fibrous structures The clinical course is usually a long one of either months or years but there are always exceptions to the rule as is illustrated here

**Case VII**—A rather unusual stormy clinical course for a benign meningioma On set of cerebral symptoms acute Late development of localizing signs Ventriculography aids in localization Craniotomy Successful removal of tumor Mild postoperative sequelae

**History**—L V female married aged thirty five admitted July 18 1925 Her family history is negative She has been married thirteen years Two children living and well She induced five abortions has had a pelvic operation within the last

seven months for an ectopic pregnancy. She was always well until six months prior to admission to the hospital when she began to complain of repeated attacks of severe pain in the back of her head. This pain was dull in character, lasted a few hours at a time and was occasionally associated with a feeling of numbness in the right arm and leg. During these six months she began to gain weight and had acquired an additional 20 pounds. More recently about six to eight weeks before admission she noticed occasional blurring of vision also a sensation of numbness in the left half of the face. With this she developed weakness in both lower extremities. The latter progressed so that she would often fall to the ground because of lack of support. One week before admission she began to stumble in her speech often mispronouncing words. She also described a peculiar visual manifestation simulating a cintillating scotoma.

*Examination*—The patient is well developed intellectually clear cheerful somewhat euphoric often facetious. Pupils are unequal left greater than right. They are regular in outline and react to light but poorly in accommodation. There is a tendency toward divergent strabismus. The left palpebral fissure is wider than the right. There is bilateral anosmia. Bilateral corneal hypesthesia and bilateral early papilledema with a small hemorrhage in the left nerve head. There is a facial asymmetry difficult to say whether it is a left facial weakness or a contracture of the right facial due to irritation. All other cranial nerves are intact. All deep reflexes are active and equal. The right abdominal reflexes are absent. They are diminished on the left side. A fairly definite Babinski sign is elicited on the left. Gait is somewhat staggering. Head is tilted to the left chin to the right. Lumbar puncture shows clear fluid under normal pressure and no cells. Blood pressure 82/54. Blood Wassermann and cerebrospinal fluid Wassermann tests are negative.

*Course*—The above finding and the sequence of events were interpreted in terms of a neoplastic process in the pre-rolandic area on the right side. To verify this diagnosis angiography was suggested but the patient requested time for

consideration. She went home July 23, 1925 and was readmitted on August 17, 1925. On readmission she related that for the first two weeks of her stay at home she was free of symptoms but soon after headaches returned with increasing severity. They felt as hammer-like blows in back of her head. They were short in duration and were this time associated with numbness in the left half of the face only. The vision became somewhat more blurred. Attacks of dizziness became more frequent.



Fig. 143.—Radiogram of the sella turcica showing a large pituitary tumor.

Examination at this time revealed definite weakness of the left lower face, blurred margins of the disks, tremor of the tongue, diminished knee and Achilles jerk, definite left Babinski sign, absent abdominals and slight motor weakness on the left side. An x-ray of the skull showed slight enlargement of the sella turcica. Because of the x-ray finding, deep x-ray therapy was applied to the pituitary field. It was soon given up for lack of improvement and further development in the clinical picture.

The papilledema continued to increase and surgical interference was indicated. Ventriculography was done as a first step for better localization. It showed a moderate dilatation of the left ventricle and collapse with some lateral displacement of the right ventricle (Fig. 143). It was thought to place the neoplasm on the mesial aspect of the right frontal lobe. A right fronto-temporal exploration was carried out and a tumor within the



Fig. 144.—Photomicrograph showing the histologic appearance of tumor in Case VII. A rather cellular form of endothelioma (meningeoma).

right sylvian fissure was found and removed. It was a soft gray neoplasm measuring  $6 \times 6 \times 3$  cm and was histologically diagnosed as endothelioma (Fig. 144). She made an uneventful recovery and was discharged as cured on October 3, 1923.

She was completely free of headache until within a month prior to her third admission. About that time she was seized with a generalized convulsion preceded by an aura epileptic

cry sudden fall frothing at the mouth and biting of the tongue. On her third admission (February 15 1916) she showed slightly unequal pupils slight left facial weakness slight blurred margin of the disks fairly marked hemianesthesia through the skull defect. Her Jacksonian attacks in the light of the previous removal of a tumor and in the face of the left facial weakness and left Babinski were regarded as being organic in character but operative interference was not considered urgent or useful. She was allowed to go home on February 19 1926.

The patient was recently seen and aside from a few epileptiform seizures was found free of symptom.

*Comment*—Here of course a cerebral neoplasm was suspected at the first examination of the patient. The intense and almost constant headache blurring of vision the attacks of numbness in the face the speech disturbance the bilateral papilledema the left facial weakness the changes in the abdominal reflexes and the negative serologic findings indicated definitely the presence of a tumor.

The question of localization was exceedingly difficult. A review of the findings would show that they were of a somewhat disseminated character or pointed to a midline position of the tumor possibly in the vicinity of the pituitary gland. Ventriculography gave the clue to the localization and here the method of Dandy has rendered a valuable service.

**Case VIII**—An unusual case of endothelioma with a clinical picture clouded by a history of luetic infection and the appearance of an unusual cerebral monoplegic sign—foot drop—as associated with convulsive attacks and change in personality. Only late in the clinical course did there appear signs pointing to a cerebral neoplasm. Tumor removed but patient died of shock.

*History*—B. C. aged thirty is admitted on October 17 1925. Patient has been married three years. His wife is well. They have one child eighteen months old. There were no other pregnancies no miscarriages. He gives a history of having had a primary lesion ten years ago. He was then treated in the Out

patient Department of Mount Sinai Hospital with 13 mercury and 3 salvarsan injections. Only a single positive Wassermann test, 2 plus was obtained. Subsequent yearly Wassermanns have always been negative.

The onset of his present illness was acute and dates back to three months prior to admission to the hospital when one morning his wife was awakened by the peculiar noisy breathing of her husband. She noticed that he was quite rigid. She could not awaken him and she called a physician, who could not find any physical signs and considered this attack as a form of hysteria. A few hours later he felt a shock shooting from his left toes traveling up the leg to his back. In the morning he noticed that his tongue was sore and was told that it was bloody. Two days later he noticed that his left foot was weak and that he could not move his toes and at the same time he had severe pain in his back. Attempts to rest his body on his left leg would result in contraction of his limb as in a cramp but without much pain. The twitching of his left leg muscles was observed on several occasions. For the past three weeks he began to complain of headaches which occurred mainly at night and were associated with nausea and vomiting and profuse sweating. At this time a definite change in his personality and in his mental capacities became evident.

*Examination*—Patient is well nourished and well developed. His general physical condition is free of signs and symptoms. Mentally he presents some changes which are emphasized by his relatives. He is irritable, querulous and difficult to please. His cerebration is sluggish all his answers are deliberate. He himself had noticed this slowing up of his mental activity. He tires easily and after a short mental examination his attention begins to wander and can no longer be fixed on questions. There is however no impairment of intellect as far as memory, judgment and orientation is concerned.

His gait is distinctly hemiplegic. Associated movements are intact though there is considerable weakness in the left hand and arm less however than in the left leg in which there is a complete foot drop with loss of movement in the toe. The

cranial nerves are all intact except for a slight inequality in the pupils the right being larger than the left. There is also irregularity of pupil but reaction to light and in accommodation is good. Measurement of the thigh and calf muscles show some atrophy in the muscles of the thigh. All deep reflexes were obtainable with the left somewhat more active than the right. There is a Babinski sign and a definite clonus on the left side. All forms of sensation are intact except for a diminution of vibration on the left side. Cerebrospinal fluid blood and urine examinations are all negative.

**Course** — In view of the previous history of a primary infection of a positive blood Wassermann test it was thought likely that some form of *lues cerebri* was responsible for the clinical manifestations. *Pachymeningitis luetica* was also considered. The patient was subjected to a fairly intensive course of anti-luetic treatment consisting of gradually increasing doses of neo-*ir* phenamin and bicreol. At no time however was the diagnosis of a cerebral neoplasm lost sight of and when at the end of a month no definite improvement was noticed and instead a gradually increasing papilledema made its appearance it became evident that *lues* was probably not responsible for his symptom. The patient's condition remained unmodified for some time in respect to the motor power and reflexes but the papilledema increased and retinal hemorrhages appeared. A status on December 8, 1923 showed an increase in spasticity in the left leg, hyperactive left knee and ankle jerks and a definite left Babinski sign. An x-ray of the skull at this time showed evidences of early bone atrophy. Some areas were seen in the left fronto-parietal region which suggested the beginning of bone rarefaction. In spite of all the signs and because of the unusual monoplegia as evidenced by a foot drop a suspicion of a possible encephalitic process was entertained and as a last resort before surgical intervention was undertaken the patient was given a series of 4 injections of a non specific foreign protein (typhoid bacilli) but without beneficial result. At this time surgical interference was suggested to the patient. He requested time for consideration and he was allowed to go home. It was

learned soon after that the patient was admitted to the New York Polyclinic Hospital where a craniotomy was performed by Dr Ney and a surely vascular meningioma was removed. Its location was in the right paracentral lobule. The patient showed very low recuperative power and he was transfused. He soon however became exceedingly restless and unmanageable and had to be transferred to a city institution. He declined rapidly and died within a short time after the transfer.

*Comment*—The early outstanding clinical feature the foot drop coupled with a history of a primary luetic infection and the report of a positive Wassermann blood test have led one naturally to the diagnosis of neurosyphilis. Even the repeated negative Wassermann test results could not swing the opinion of the examiner from cerebral spinal syphilis. In the literature there are many references to cases of proven neurosyphilis with essentially negative findings in the spinal fluid. A few of them show but a slight pleocytosis and a mild increase of globulin. Among such forms of lues are cases of cerebral nerve palsies, cerebral gumma, instances of epilepsy, luetica and spastic spinal paralysis. A recent article in the *Jour Amer Med Assoc* emphasizes the occurrence of neurosyphilis especially of the neurovascular type with negative signs in the spinal fluid. Other features in the case which favored neurosyphilis were the slight oscillation in the clinical manifestations and at one time a slight improvement shown in some return of power and the disappearance of headaches and freedom from convulsive attacks. The question of localization was never much in doubt. The left sided paretic manifestations pointed to a course in the right frontal or frontoparietal lesion and when antiluetic treatment failed the evidence of a progressive increase in intracranial pressure appeared. It was quite evident that we had to deal with a tumor.

#### GROUP VII PITUITARY ADENOMA

In this group we have one case.

In the clinical history there are all the features that characterize this form of tumor. The headaches, the disturbance in the sexual cycle, the metabolic disturbances, the typical bi-

*Comment*—This case is a rather typical instance of a primary pituitary neoplasm and offers no difficulties in diagnosis. The general appearance of the patient the objective findings such as the bitemporal hemianopsia the bilateral optic atrophy the erosion of the sella turcica the manifestations of increased intracranial tension and finally the vegetative disturbances such as polydipsia and polyuria pointed definitely in the direction of a pituitary neoplasm. Of interest of course are the beneficial results of the decompression of the sella and the subsequent application of radium. It should be remembered that while no cure has been established the localization of the lesion was verified by the operation and an opening is left for a subsequent more radical surgical intervention should future development demand it.

#### GROUP VIII METASTATIC TUMORS

We now approach the last group of our cases the secondary metastatic tumors of the brain and here we may sum up their clinical features by quoting the conclusions drawn by Globus and Zelinsky<sup>5</sup> in their study of 15 cases of verified secondary metastatic brain tumors. Summing up the more constantly found clinical manifestations we are tempted to regard the following as characteristic of brain tumors:

1 An acute and often precipitate onset of cerebral manifestations commonly of a disjointed or disseminated character simulating a meningo-encephalitic process.

2 Symptoms of increased intracranial pressure such as headache nausea vomiting and dizziness which are usually out of proportion to the objective neurologic findings.

3 Papilledema is not common. It occurs usually when a tumor mass is present in a situation where it can obstruct the escape of cerebrospinal fluid from the lateral ventricles.

4 Meningeal signs often associated with radicular pain are not infrequent and pleocytosis is occasionally found very likely as the result of direct invasion by tumor cells of either the subarachnoid space or the subependymal tissue.

5 A rapidly declining clinical course characterized by the

progressive appearance of new and poorly linked or diffuse signs and by general wasting and growing asthenia

6 Psychotic manifestation in our series of cases were present in a limited number of instances as a terminal event. They are not in our opinion of diagnostic value beyond indicating a wide spread cellular reaction

It is quite apparent that the above enumerated clinical features are most commonly found in diffuse meningo encephalitic lesions and not infrequently in primary malignant tumors of the brain particularly in the form of the primary malignant cerebral neoplasms described by Globus and Strauss<sup>1</sup>. The first can often be ruled out by the absence of febrile manifestations and negative serologic and x-ray findings. Primary malignant tumors differ from those under consideration by their tendency to manifest more localizing objective neurologic signs and their more uniform clinical course

It can be said then that an acute onset of cerebral symptoms followed rapidly by the development of neurologic signs of a disseminated character and symptoms of increased intracranial tension in the absence of disk changes positive serologic findings or febrile manifestations, suggests very strongly a metastatic neoplastic process. The probability is further strengthened by the rapid evolution of neurologic signs and the appearance of progressive wasting, and of asthenia out of proportion to that usually encountered in primary brain tumors. Under such circumstances a search should be made (with the aid of all available laboratory tests and x-ray examinations) for the primary malignant focus

**Case X—Cerebral manifestations one month's duration**  
History of previous removal of malignant neoplasm of the toe  
Acute onset of signs of focal cerebral involvement without decided signs of increased intracranial tension. Sudden death without operative interference

*Necropsy*—Metastatic melanoblastoma of the brain

*History*—B. M. aged thirty seven married housewife was admitted to Mount Sinai Hospital November 19 1925. She had

a previous admission to the hospital when a toe was amputated for a darkened pigmented area. The latter was reported by the pathologist as melanocarcinoma. Two years have elapsed since the amputation the patient remaining perfectly well during that period until one month ago when she began to complain of urinary incontinence and occasional attacks of nausea. She also began to experience difficulty in speech. Two weeks later one night she suddenly lost consciousness for a period of ten minutes and on arising the next morning noticed weakness in the right arm and leg.

*Examination*—The patient presents a right hemiparesis including face arm and leg, with pyramidal tract signs such as increased deep reflexes, diminished abdominals and a positive Babinski sign on the right side. The left pupil is slightly larger than the right both reacting well to light and in accommodation. There is no papilledema and no ocular paralysis. The blood and cerebrospinal fluid Wassermann tests are negative. Examination of the abdomen reveals no masses or tender areas.

An x-ray of the chest disclosed a number of circular areas apparently metastatic masses in the left lung. With this in mind and in view of the history of toe amputation the diagnosis of metastatic melanocarcinoma of the brain was made and the case considered inoperable.

*Course*—The patient's residence in the hospital was marked by progressive decline. Later in the course there occurred several attacks of Jacksonian seizures involving the right side. The disks developed mild swelling. Finally on December 11th the patient was seized by a generalized convolution which terminated in death.

*Necropsy Findings*—Removal of tissue was possible only through a small trephine opening. A small scalpel was passed through the wound in the direction of the left frontal precentral region and tumor tissue was brought out in large masses. It was dark brown in color granular and friable. The histologic picture was that of a melanoblastoma (Fig. 147).

*Comment*—Here again the signs and symptoms of cerebral involvement appeared very acutely. The clinical course was ex-

tremely rapid and was characterized by the occurrence of some what isolated and poorly linked manifestations such as the early appearance of urinary incontinence followed by attacks of nau sea and difficulty in speech. Then the development of mild paraparesis in the lower extremities with terminal occurrence of a complete right hemiplegia.



Fig 147.—Photomicrograph showing the histologic features of the tumor in Case X. Solid cords of pigmented epithelial cells loaded with melanin typical of melanoblastoma.

All these manifestations occurred without disk changes without evidence of marked intracranial pressure without rise in temperature and without evidence of luetic infection. They pointed strongly in the direction of metastatic neoplasm of the brain which received further support from an earlier history of an amputation of a toe for a melanoblastoma.

The postmortem study in this case was too meager to permit

a full discussion of the relationship of the gross anatomic changes to the various physical findings. The latter however point to a well circumscribed lesion in the left cerebral hemisphere and in view of the fact that in another case of metastatic melanoblastoma (Case 13) the metastatic lesion was single it would appear that very likely here also there was but one single metastatic focus.

**Case XI — Cerebral symptoms of four weeks duration. History of previous removal of malignant tumor of the face. Acute onset of signs and symptoms of increased intracranial tension. Initial symptom severe headache. Disseminated objective findings. Rapid decline. Death without operative interference.**

*Autopsy.* Metastatic melanoblastoma.

**History.** I. J. aged twenty nine married engraver was admitted to the Mount Sinai Hospital on June 14, 1924 complaining of headache and dizziness. His family history was negative. Two years previous to the onset of the present illness a tumor was removed from his cheek which at the time was considered to be a squamous cell carcinoma. He remained well up to four months prior to his admission to the hospital when he began to suffer with bitemporal headache and attacks of dizziness. He was forced to give up work because of the constant headache, dizziness, and the gradual development of impairment of vision. More recently there developed diplopia and attacks of vomiting.

**Examination.** On admission to the hospital he was found in good physical condition with the following positive objective neurologic findings: Unequal pupils right greater than left, both reacting normally to light and in accommodation; bilateral rotary nystagmus; bilateral exophthalmus; bilateral corneal hypesthesia; bilateral papilledema; tendency to left homonymous hemianopsia; bilateral external rectus weakness; bilateral facial paresis more marked on the right side; weakness of muscles of mastication on the right side. The urine, blood chemistry, blood and spinal fluid ergology were all negative. Twice repeated radiography of the skull failed to reveal any abnormality.

Examination of thoracic and abdominal organs revealed no abnormalities

*Course*—The diagnosis considered at this time was that of cerebral neoplasm most likely suprasella in location. In view of the history of a previous removal of a malignant tumor the metastatic character of the tumor was suspected

The patient's stay in the hospital was marked by progressive decline in his general condition and by advancing papilledema. In an attempt to save the patient's eyesight bilateral subtemporal decompression was performed but this did not inter-



Fig 148—Gross appearance and location of tumor (melanoblastoma) in Case VI

rupt the steady decline in the patient's condition death occurring about five weeks after admission to the hospital

*Necropsy Findings*—In the right occipital region a discolored area is noted in the center of which a small opening is found through which yellowish clear fluid is slowly exuding. On cutting through at this level a large neoplastic mass is found nodular in structure granular in appearance and varying in color from pearly white in some areas to brownish red in others (Fig 148)

A section through the most typical portion of the neoplasm

presents a fairly uniform picture not unlike Case XII. Here however cells of three varieties are seen. One variety is epitheloid in character and polygonal in shape the cells containing large round vesicular nuclei. These cells are grouped around blood vessels giving the impression of an arrangement seen in perithelioma and present a nest like appearance. A second type is a cell fusiform in outline forming bands encircling the above described nests. The third type is a bladder shaped cell with small pyknotic nucleus and filled with a coarse brown pigment. Numerous mitotic figures are seen everywhere and large hemorrhagic areas are encountered.

*Diagnosis*—Metastatic melanoblastoma

*Comment*—Here of course our attention is drawn to the following facts in the clinical history. An acute onset of head ache and dizziness with the development of neurologic objective signs pointing to disseminated lesion. The fixed facies and the diplopia due to bilateral external rectus weakness could well be considered in the light of an encephalitic process were it not for the hemianopsia bilateral papilledema—signs which warned of focalized neoplastic lesion. Of course the history of a primary lesion elsewhere made the metastatic character of the lesion very probable.

Little difficulty is found in correlating the anatomic findings with the clinical manifestations. This is particularly true of the left homonymous hemianopsia with the tumor mass almost completely replacing the right occipital lobe. The bilaterality of some of the signs suggested at one time a suprasella localization but a neoplasm of the type and location described will compress the third ventricle thus giving rise to marked internal hydrocephalus which in turn resulted in bilaterality of neurologic signs and in the papilledema. Here again it is striking that the metastatic process was a single mass.

**Case XII**—An uncommon form of metastatic tumor of the brain. Long clinical course which advanced rapidly to its full development in its later stages. The appearance of subcutaneous nodules in the terminal stages gave the clue to the true character

of the cerebral involvement—metastatic neuroblastoma (primary in the adrenal)

*History*—I B aged forty five tailor married had two admissions to the hospital. On his first admission which was on December 20 1925 there was elicited a history of two years of fairly constant pain in his lower extremities. His present illness, however, be dated back to about November 1 1925 when he began to suffer from headaches occurring almost daily and increasing progressively in intensity, in the right temporo occipital region. A week before entering the hospital he began to complain of lumbar pain chiefly in the right side. The pain would radiate all the way up as high as the mastoid region of the skull.

*Examination* (First Admission)—The positive findings were few. There was a right facial weakness (supranuclear in type) deviation of the tongue to the right increase of the deep reflexes on the right side and early bilateral papilledema. Mentally he was somewhat dull.

In the left flank there was felt just beneath the skin a small mass which was considered to be a lipoma.

The diagnostic possibilities considered during his first stay in the hospital were Cerebral vascular disease and cerebral neoplasm in the left hemisphere. The latter was thought to be the more likely diagnosis. Ventriculography was advised but the patient requested time for consideration and was allowed to go home.

He returned in two weeks (January 13th) still complaining of right temporal headache and called attention to a steadily growing mass in the right lumbar region.

*Examination* (Second Admission)—There are now several tumor like masses distributed over the chest abdomen, and extremities. The patient is mentally more sluggish and somewhat childish in his behavior. There is slight percussion tenderness of the left side of the skull and a slight prominence of the left eyeball. Both external recti muscles are paretic the right more than the left. There is paresis of the two lower branches of the right facial slight paresis of the right arm and leg. The abdominal reflexes are absent. The left knee and ankle jerks are

more active than the right. There is a positive Hoffmann sign in the left hand. The vibratory and joint position sense in both lower extremities are impaired. The fundi show bilateral papilledema with hemorrhages and the exophthalmometer reading confirms the impression of a proptosis of the left eye.

*Course*—A fragment of the mass removed by biopsy from the preauricular region was reported by the laboratory to be a metastatic malignant tumor probably in the nature of a neuroblastoma. In view of the advancing papilledema and beginning

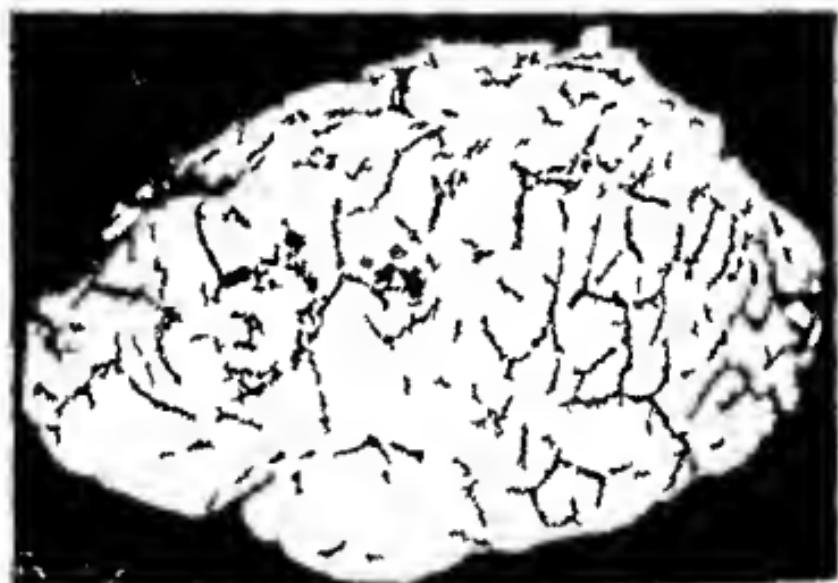


Fig. 149.—Appearance of left hemisphere in C. III. He is in fast to date A and B. Similar edema was also found in the right hemisphere.

optic atrophy a right subtemporal decompression was performed on January 29th.

For a few days following the operation the patient seemed to be doing well but in the course of a week he grew progressively worse sinking gradually into semistupor and died on the 19th of February.

*Anatomic Findings*—There is evidence of moderate increase of intracranial pressure. The right hemisphere presents a large rather hard nodular mass which can easily be shelled out. It is located in the region of the middle frontal convolution in it

middle third and measures about 2 cm in diameter. Two similar nodules are found in the left hemisphere (Fig 149) one in location similar to that on the right side but much smaller in size. Another (third) lies directly in front of the middle portion of precentral gyrus. It measures about 7 mm in diameter (Fig 149).



Fig 150.—Histologic appearance of tumor in Case XII. It presents features typical of neuroblastoma.

By rectal examination a large and friable mass is found in the left kidney region. The left kidney on removal with a part of this mass shows a large tumor attached to the upper pole of the kidney. It is yellowish brown in color, friable and in areas quite hemorrhagic.

Histologic preparations obtained from this mass show the tumor to be a neuroblastoma (Fig 150) most likely primary in the adrenal.<sup>6</sup>

## SUMMARY

Brain tumors like all other pathologic processes in the central nervous system present two important problems demanding solution the first concerning the character of the neoplasm and the other concerning its location. It is not necessary to emphasize here that a good anamnesis (in other words a good life history of the patient) is essential for the determination of the character of the lesion and that a thorough search for objective signs and their proper evaluation hold the secret for correct localization of the lesion. Hence the detailed survey of subjective and objective manifestation bearing directly upon the unfolding of the clinical picture served as the guiding principle in the presentation of all the clinical data in each individual case here presented.

In most of these instances the early symptoms such as vomiting headache vertiginous attack and mild visual disturbances were such as to induce the patient to consult an internist. It is very important therefore that the internist should recognize the significance of these symptoms so that the aid of a neurologist may be invoked at an early stage of the disease.

It frequently happens that these patients as seen by a review of the cases are treated for a considerable period of time for lesions other than an intracranial one and in this way much valuable time is lost and the patient subjected to unwarranted expense and suffering. If the internist possesses a general knowledge of the early symptoms of brain tumor and has them in mind he will frequently avoid an error in diagnosis.

These cases also show that even in the hands of able neurologists localization and diagnosis of tumor of the brain is by no means an easy task.

Note—We are indebted to Dr. Arthur M. Kraut for assistance in the preparation of this paper.

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## CLINIC OF DR RUDOLPH KRAMER

MT SINAI HOSPITAL

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### BRONCHOSCOPY IN PULMONARY SUPPURATION

BRONCHOSCOPY is indicated in cases in which acute or chronic pulmonary suppuration is suspected. It is a necessary diagnostic and therapeutic procedure. Diagnostically it aids first in the exact localization of the lesion, second in determining the type of process affecting the lung, third in bringing to light primary lesions upon which the suppurative processes are dependent. Therapeutically bronchoscopy is of value in the economic restoration of the patient and as a method of cure.

In addition to the usual general contraindications to bronchoscopy such as aortic aneurysm, marked hypertension, anatomic deformities of the head and neck, bronchoscopy is inadvisable in cases of pulmonary suppuration with marked prostration, dyspnea and cardiac weakness. In other words endoscopy should not be resorted to in cases in which the strain of transportation to an operating room, placing of the body in a strained position and increased cough would be dangerous. Hemoptysis in itself is no contraindication, the general condition of the patient is of greater moment. Bleeding is not necessarily increased provided care in anesthesia and skill in manipulation is exercised. On the other hand it may be possible to find and remove the cause of the bleeding such as a new growth or a foreign body, or to treat a bleeding vessel.

We shall not touch on the technic of bronchoscopy in pulmonary suppuration except to say that the type of bronchoscope used is of importance. The proximally illuminated bronchoscope such as we use illuminates the bronchial tree far beyond the distal end of the instrument thus enabling the operator to obtain a comprehensive view of the bronchial field and evaluate patial

relations here. The distally illuminated bronchoscope such as the Jackson throws light only a short distance in advance of the distal end of the tube and for this reason an extended view of the region to be surveyed is not obtainable. For example, those lesions which are revealed by contour changes over a fairly large area cannot as a rule be diagnosed by distally illuminated bronchoscopes. The use of the proximally illuminated bronchoscope has in great part been responsible for the fact that diagnostic bronchoscopy was developed at Mount Sinai Hospital by Dr. Yankauer.

The localization of lesions is determined with much greater precision when bronchoscopy is added to the other methods of examination. By this procedure tertiary and quaternary bronchi can be observed and the portion of the involved lung draining into these bronchi be determined. In cases in which pus flows into bronchi other than the one draining the abscess coagulation might arise. But if the bronchi are cleared the reappearance of pus watched for and inflammatory lesions of the affected bronchus noted no error in localization should arise. Pressure on a bronchus by a large abscess may reveal its location definitely. In a small percentage of cases it is possible to enter the abscess cavity directly with the bronchoscope. Bronchiectasis is readily and definitely revealed by endoscopy much more accurately and to a finer degree than by any other diagnostic means at our disposal. The less extensive and virulent infections such as those with thick, glairy, mucoid secretion in one or more of the small bronchi with or without alveolar involvement are also diagnosed with greater precision by bronchoscopy. In a very few cases the abscess cavity is shut off from a bronchus accessible to view so that there is no escape of secretion and no demonstrable lesion. In these cases bronchoscopy may fail to localize the diseased area.

The nature of the pathologic process present can be determined most accurately in the greater majority of cases by bronchoscopy. The presence of an abscess of bronchiectasis whether single or multiple or unresolved pneumonia of bronchitis of gangrenous or fibrinous lesions is established by

direct vision. The existence of secondary lesions such as granulation tissue ulcerations strictures of the bronchi can practically only be diagnosed in this way. In a number of cases unsuspected conditions causing the pulmonary suppuration such as foreign bodies malignant or benign new growths and stenoses of the bronchi are brought to light. The importance for the cure of the suppuration of the removal of these lesions as early as possible whenever feasible is obvious. Prolonged retention of a foreign body may lead to a chronic lung abscess which does not heal even after the offending foreign body has been extracted. The determination of the presence of a new growth or stenosis of a bronchus is absolutely essential before rational therapy can be decided upon. Misguided treatment can be avoided and proper attempts at relief or cure of these diseases can only be made when their existence is established.

Bronchoscopy treatment of lung suppuration was established by Dr Sidney Yankauer in 1916. For a number of years his work was not followed up to any extent by other men but in the past few years the number of men proceeding along the road pointed out by him has grown to a goodly company. The bronchoscopic treatment in brief consists in simultaneous irrigation and aspiration of the affected lung territory and treatment of associated lesions such as ulcerations granulations and strictures of the bronchi at intervals determined by the severity of the local process by its response to treatment and by the condition of the patient. In severe cases treatments twice a week are advisable in less severe cases once a week is sufficient. Usually as the condition improves the interval between treatments is lengthened. The first bronoscopies are uncomfortable and often alarming to the patient. After three or four treatments the patient is generally so little upset by the procedure that he is able to leave the hospital one to four hours after bronchoscopy and next morning go about his affairs.

The results of bronchoscopic treatment of lung suppuration in cases from the service of Dr Sidney Yankauer at Mt Sinai Hospital and from the private practice of Dr Yankauer and myself are as follows. One hundred and five patients have been

treated of these 28 cases or 24 per cent are cured 46 or 41 percent improved 20 or 19 per cent unimproved or operated upon and 11 or 10 per cent died. The cases treated include acute and chronic lung abscesses bronchiectasis unresolved pneumonia foreign body and new growth lung suppurative lesions. About 60 per cent of the cured cases were chronic lesions that is one year or longer in duration at the onset of treatment. The criteria of cure were freedom from subjective symptoms such as cough expectoration fever malaise absence of objective symptoms absence of lesions on bronchoscopy and clear lung field or in chronic cases evidences of fibrosis of area on Roentgen examination. With the exception of 3 cases of less than one year's duration all the cured cases have been well for a period of six months or more. By the term improved we mean relief to a marked degree from subjective symptoms diminution in objective and Roentgen ray lesions marked clearing up of process on bronchoscopic examination and in addition ability to work at the daily occupation. By unimproved we mean the absence of marked relief from symptoms and the inability to pursue a livelihood. In this group are included all cases subjected to operative procedures after bronchoscopic treatment had been employed. Of the 11 cases that died 9 were due to a gradual progression of the pulmonary lesions or to an acute pneumonia. One died of shock following pleural aspiration for pneumothorax occurring five days after the sixth bronchoscopy and another patient a foreign body lung abscess case died with symptoms of shock one day after the third bronchoscopy. In this patient a woman very acutely ill each of the bronchoscopic treatments had been associated with marked prostration twitching and cyanosis. We feel that this is the only case in which the death might be ascribed to bronchoscopy.

The basis for treatment as indicated by bronchoscopy can be summed up briefly in the light of our present knowledge. Any case of lung suppuration in which pus coming from the suppurative focus can be found by bronchoscopy should be treated bronchoscopically and medically. In other words where pus or evidences of infection are present in a bronchus leading to the

diseased portion of lung that case is suitable for endoscopic treatment. If the disease is progressive in spite of treatment or if the patient's condition becomes precarious surgery should be resorted to. If after a prolonged course of careful and exact bronchoscopic irrigations the patient's condition does not materially improve surgery is indicated. The sum total of experience in bronchoscopic treatment of lung suppuration is not sufficiently large to enable us to draw any reasonably accurate conclusions as to the results of this type of therapy in any given case. Cases of unresolved pneumonia, acute suppurative lesions, lung abscesses in which the abscess cavity can be directly entered with the bronchoscope give the best results but in some of these groups of infections we have failed. On the other hand cases of multiple bronchiectasis and of lung abscess in which the cavity could not be directly entered have been cured by bronchoscopic treatment so that we feel no definite indications for treatment beyond those mentioned above can be laid down.

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## CLINIC OF DR. WINFIELD SCOTT PUGH

### CITY HOSPITAL

#### URINARY OBSTRUCTION

WE regard it as a most unusual opportunity to present to you today a series of cases representing urinary obstructions of supposedly unusual forms. Our reason for grouping these cases is because they all occur much more frequently than supposed. I might say quite often enough to amaze even the most experienced surgeon. The problem of drainage in the urinary tract is constantly with us and it is often surprising what great damage is caused by obstructions thought trivial. Guy Hunner and Gilbert Thomas have recently emphasized the importance of drainage in renal disease. The former believes we have greatly overlooked this in the past. This oversight, if we may call it such, is not limited to any one area but is applicable to the entire urinary tract.

Starting with the external urethral meatus, many of you have no doubt seen the congenitally small opening. What a trap this may provide for any infection happening along. In the urethra proper a light elevation or obstruction of only  $\frac{1}{4}$  inch suffices to cause back pressure. This will readily rekindle an old flame smoldering in the prostate and seminal vesicles. During the past twenty even years we have seen this occur repeatedly. Many of these cases are badly treated. A hyperplasia and the presence of pus in the prostate and vesicles may be detected. If however we do not recognize the urethral obstruction no matter how apparently trivial our attempts at cure are vain. The energy expended in prostatic massage is all wasted. This form of treatment is often condemned because it will not relieve a disease of non-prostatic etiology. These minor urethral obstructions to

which we are calling to our attention are not strictures in the true acceptance of the term but are old infiltrations of varying degree. Our reason for prefacing this clinic with these remarks is because this subject is almost daily brought to our attention.

#### URETERAL OBSTRUCTION BY ENLARGED SEMINAL VESICLES

A form of ureteral obstruction which we believe to be much more common than generally realized is that resulting from an enlarged seminal vesicle. One glance at the accompanying illus-

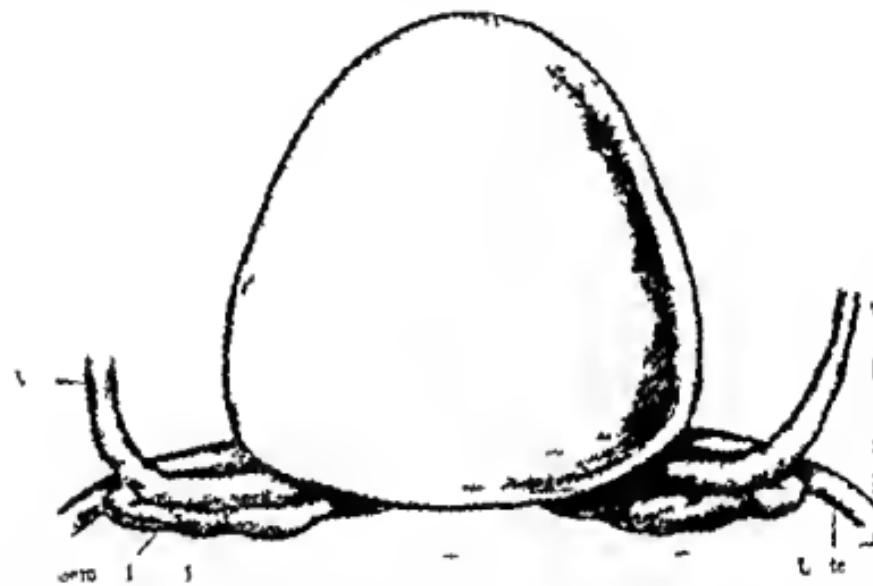


Fig. 151. Showing relations of bladder and rectum and rectovesical pouch above downward.

tration of the regional anatomy involved will impress you with its possibilities. These two organs you will note are rather closely related. Dissections of the parts make them seem even more intimate than this picture does. In many of the cadavers that we have seen but a very moderate enlargement of the vesicle would be necessary to produce an encroachment on the ureteral lumen.

Gonorrhœa is a widely spread infection. A huge percentage have it and we often wonder how any males escape. Among this vast army of gonorrhœals there are indeed few in whom the infection is limited to the anterior urethra. In cases involving the pos-

terior portion we find Mayer in 1903 reporting 60 per cent with a definite involvement of the seminal vesicles. Lewin and Bohm in 1900 reported that in an examination of 1000 cases of gonorrhea 25 per cent showed seminal vesiculitis. In the last twenty seven years we have had an unusual opportunity to study gonococcus infections. Of these a very high percentage received a thorough examination. Our observations were made under the best possible conditions and control of the patient was ideal. The men were placed in bed at rest and were given the care of an acute febrile infection. In spite of this evidence of posterior involvement became noticeable in a very great percentage. Enlarged and painful seminal vesicles were noted in about 75 per cent of our patients. In a very few instances one vesicle was involved the vast majority, however revealing bilateral infections.

Many of these vesicles were very large and did not subside under the treatment then in vogue. In 360 cases of persistent seminal vesiculitis a vasostomy was done. We say without hesitation that about 65 per cent of these might be designated flat failures. We wondered often what the future held in store for these unfortunates. Sufficient evidence has accumulated to convince us that the possibilities are grave indeed.

Our attention was drawn to the possibilities of ureteral obstruction by the seminal vesicles after reading a paper by Hugh Young in a French Journal of 1904. In this article he referred to the close proximity of the vesicle and ureter with the possibilities of disease involving both. Young's case the first on record had a complete ureteral obstruction and a nephro-ureterectomy was done. In 1909 Belfield in his studies of the seminal vesicle also refers to ureteral menace by close proximity of the organs. Herbst in 1909 called our attention to the relation of ureterocele and seminal vesiculitis. This report showed admirably the possibilities of ureteral involvement in seminal vesiculitis. In all of the ureteroceles that we have seen an old vesiculitis has also been present.

In 1922 Marks and Hoffman reported 3 cases which greatly emphasized the possibility of vesicular disease as a menace to renal integrity.

areas it even suggested an ulceration. The deep urethra bled very easily and profusely. On glancing at the right ureter we noticed that it was perched well up in the air. Its orifice seemed normal but we were unable to enter it even with a filiform. The left kidney urine seemed normal and responded with a good phthalein output.

Following the above our patient was subjected to a full hour of diathermy to his prostate and vesicular region. He stood

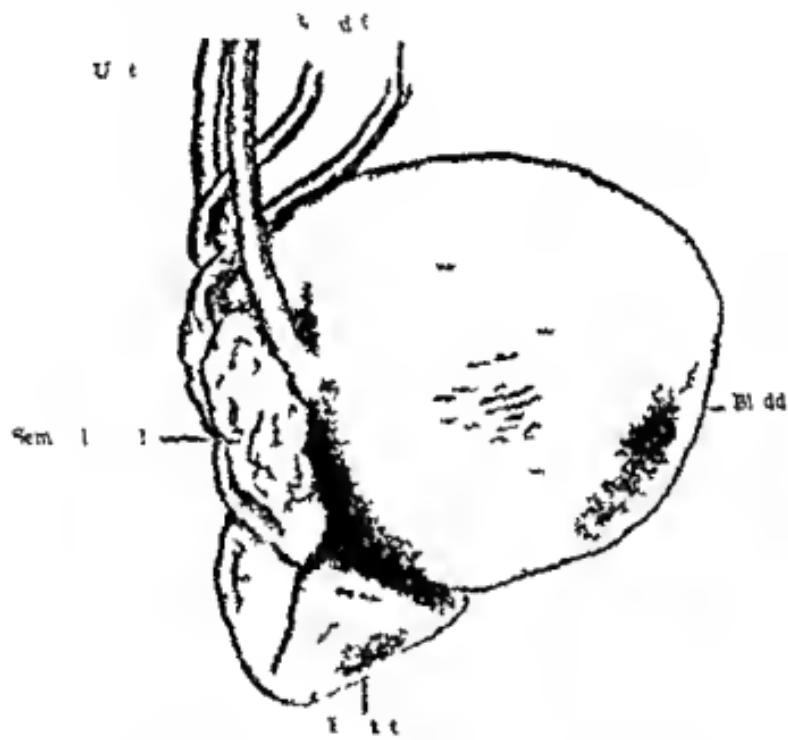


Fig 12.—Live human genitalia; sem. 1 muscle; 120 uret

1500 ma for an hour without being uncomfortable. Diathermy is undoubtedly the *meilleur* of treatment in case of this type. Do not follow the example of many of our prominent surgeons who are trying to *get results with a toy*. It simply cannot be done. A pocket affair may be all right for fulguration but for most technics we require high tension. Do not forget that point.

Before we let this young man go we shall go over him again for painful areas. You will note that on pressure over the right

kidney just at present he is not particularly sensitive. On first percussion sometimes called Murphy's method there is a quick response. In our humble opinion this does not necessarily mean kidney disease but a close relative namely retention in the renal pelvis.

As we pass over on to the anterior abdomen we descend the edge of the right rectus muscle. What do we find? Just below the umbilicus we begin to enter an area in which we elicit pain. We are directly over the seminal vesicle lying behind the bladder and above the prostate. Many an innocent little appendix has been removed where a ureteral stone and I doubt not many seminal vesicles also were causing the conflagration. We will examine the young man rectally for you and we hope several at least will feel this very big and painful vesicle.

You say may this not be a seminal vesiculitis and a ureteral stone as well? Certainly it may and every method must be exhausted to rule out this possibility.

Why the hematuria? We are dealing with a relighting of an old acute posterior urethritis. This is the most common cause of urethral bleeding. We will place this man on urotropin. While we do not have a large amount of faith in urinary antiseptics they do sometimes seem to help. He will be given hot Sitz baths and as much local heat as he can stand. Diathermy will be used every other day as above noted.

*Note*—One week later we were able to enter the renal pelvis with a catheter. Retention was shown after twenty minutes. This has since subsided entirely.

#### URETHRAL VALVES

One frequently bears strictures of the urethra spoken of as congenital and acquired. The former is not a stricture in the correct interpretation of the term. What we have to deal with in the newborn is a condition of hypertrophy of the verumontanum or the presence of urethral folds. These we now designate as urethral valves. This form of urethral obstruction is not a newly discovered entity as many think.

Young in his original article records it as first discovered by

Langenbeck in 1802 and again by Velpeau in 1832. In 1915 it was well described by Beer in his case reports. Hinman tells us that urethral valves may be regarded as rare but that many are overlooked. In a careful review of the world's literature however he was able to unearth only about 56 cases.

What is the cause of urethral valves? Watson believe they appear as early as the thirteenth week and that the top of the colliculus in some way becomes attached to the roof of the urethra. It may go on for years (as in a case we saw in the United States Naval Service) without producing symptoms. Several writers believe it an anomalous development of the Wolffian and Mullerian ducts. Ehrich proposes that it is an overdevelopment of the normal folds of the urethra which cause narrowing. Another and more recent theory is that of Fischl. This author believes that a proliferation of the epithelium on the roof of the sinus urogenitalis with subsequent connective tissue adherent to the opposite wall readily accounts for the anomaly.

Urethral valves are essentially a childhood disease. In Hinman's series of 56 cases 12 were found in the first year of life. Fischl reports a case in a five month fetus. Schmidt another in a seven month fetus. Hinman reports as his oldest that in a man fifty seven and never on one at eighty five years.

**Symptomatology** There is really nothing distinctive in the symptomatology of this disease. Any symptoms of urinary distress such as dysuria, urgency, frequency and dribbling in a very young child should always cause us to think of valve as a possibility. At time fretfulness and restlessness are noted. Persistent pyuria will certainly be seen. Evidence of back pressure with bladder distention, hydronephrosis, etc. will make its appearance later. As a result of this we are going to have symptoms due to the associated pyelonephritis with evidence of renal insufficiency. The final picture is usually that of gastrointestinal disturbances, chills, fever and eventually uremia.

**Diagnosis** — With symptoms referable to the urinary tract our diagnosis will be made on the complete urologic examination. There is still a goodly amount of opposition among physicians to cystoscopy in children. In these days of modern medi-

cine we do not hesitate to do a bronchoscopy to relieve a condition of the air passages. Nor do we stop any longer at a lumbar puncture or even at opening the skull for a suppurative lesion. Then why object to a cystoscopy? It is just as easily done in a child as in the adult. Many of these cases show abdominal distention usually relieved by a small catheter. The

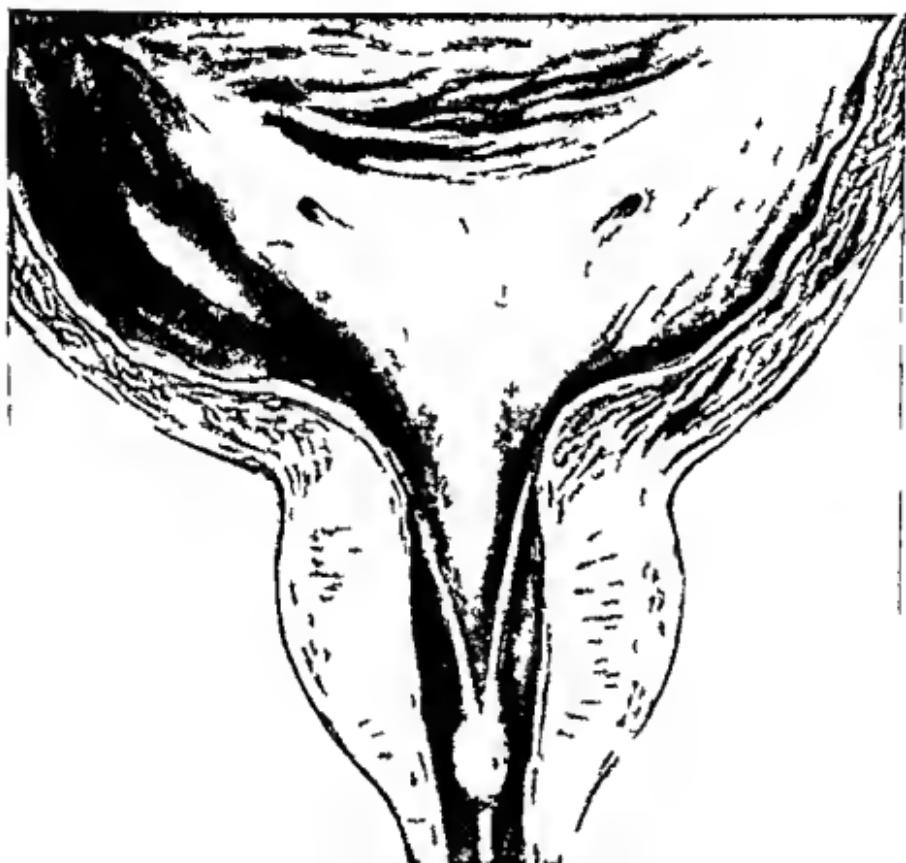


Fig. 153.—Markedly developed internal valves

lesion may easily be seen with a small sized cystoscope 12 to 18 F.

In addition to this we often obtain valuable information from a cystogram. For this purpose we use a 12 per cent sodium iodid solution. This will not only often reveal the lesion but in addition the hydro ureters and hydronephrosis which

frequently accompanies valve disease. However when a cystogram is negative a cystoscopy must be insisted on.

**Case II—J Y** aged seven white native of United States

*Chief Complaint*—Pyuria and frequent attacks of diarrhea

*Family History*—Mother and father alive and well. No history of serious illness.

*Previous Personal History*—Measles and mumps a year or so ago. Otherwise negative. There has however always been some urinary disturbance since birth.

*Present Illness*—According to the patient's statement this began about six months ago when it was noticed for the first time that his urine was quite white. Frequency and urgency made their appearance becoming quite marked. Child voids about every thirty or forty five minutes. Very small amounts of urine are passed at each micturition. He has been treated by several physicians none of whom suggested an examination until seen by Dr S Low his present attendant.

*Physical Examination*—On glancing at this boy you see at once that he is desperately ill. He is hypersensitive and does not like anyone to come near him. His urine spurts from him every few minutes and it is difficult to keep him clean. The child has an almost complete anorexia and it is also difficult to feed him.

On glancing at the abdomen you will note a distention just above the symphysis. This in spite of the frequent voiding is undoubtedly bladder. The blood pressure shows a systolic of 125 diastolic 75. Blood examinations reveal a red cell count of 3 850 000 white cells 11 000 polys 83 per cent.

The urine is loaded with white blood cells and much free pus. Urinary culture shows *Bacillus coli*.

A plain bladder phthalein test shows about 17 per cent in the first hour 10 per cent in the second hour and about 20 per cent in the third.

*Cystoscopy*—For this purpose we will use a simple observation cystoscope of No 12 F. It was our intention to do the bladder in this case under sacral anesthesia. We have used this procedure in a great many cystoscopies in children and find it very

satisfactory. This boy is so nervous that the neurologists have advised using gas oxygen we are following their suggestion.

Those of you who have an opportunity will be able to see this marked granular cystitis and drawing the tube into the urethra we note a set of valves which seem to be attached to the anterior end of the verumontanum from here they extend well up on the lateral urethral walls toward the bladder neck. Slipping back once more into the bladder you will notice that its appearance suggests trabeculation. Both urethral openings are enormously dilated the left suggesting a large diverticular orifice.

Treatment — This consists in the destruction of the valves either by suprapubic cystotomy, perineal section or a combination of these procedures. Another method is that of fulguration. In this case the valves appear to be not of a very dense structure and we think they will respond to the high frequency current. We shall use for this purpose a number 18 MacCarthy cystomethoscope with a 5 Φ fulgurating tip. If this fails we still have time to resort to the more radical procedures.

Before leaving this subject do not forget that in these cases where apparent bladder distention and kidney injury have taken place a preliminary catheter treatment or decompression as is done prior to prostatectomy may be necessary.

Conclusions — In conclusion we may say:

- 1 Urethral valves are unusual
- 2 Their cause is still obscure
- 3 It is essentially a disease of very early life
- 4 The diagnosis is readily made by cystoscopy and urography
- 5 The treatment is not difficult and the results are fairly good

#### PROSTATIC BAR

If there is one idea deeply rooted in the mind of the average surgeon it is that prostatic hypertrophy is always the cause of obstructive uropathy in advancing years. It is perhaps true that it is the most frequent form of hindrance to the urinary stream but not the only one. How frequently in consultation we have heard the physician say This man has nocturia fre-

quency and hesitation his rectum has been explored and his prostate found greatly enlarged. The diagnosis, therefore is supposed to be prostatic hypertrophy.

A prostate that bulges slightly into the rectum does not mean hypertrophy. Some criticism has been made of those who insist upon a cysto urethroscopy in supposed prostatitis. We believe this examination is always justified as we cannot tell what is wrong with a prostate without a complete observation.

There are two pathologic entities that are fairly frequent and which in our experience often provide diagnostic pitfalls to wit prostatic bar and stricture of the urethra. We have recently seen a case in which a suprapubic cystotomy had been performed. The surgeon was having difficulties in trying to remove a prostatic adenoma that did not exist. Directly across the neck of the bladder was a typical median bar a resection of which promptly relieved the sufferer. In urinary condition diagnosis and an exact knowledge of the pathology are all important in providing permanent relief.

What procedure shall we adopt where we suspect obstruction in the lower urinary tract? First and of great importance is a general physical examination this if possible by a competent internist. Close co-operation between the urologist and the medical man is of the greatest value. We cannot go into detail of the many points that may be brought out by our colleague but we will merely mention the hypertensive and the arterio clerotic heart.

Clinical chemistry is of greatest importance particularly that concerned with nitrogen retention.

*Urologic Examination*—By all means the first and an extremely important step is the introduction of an olive sound sometimes called the bulbus bougie or the bougie a boule. Do not consider those of metal with rigid stems. We employ an Eynard silk type of about 20 F. This is well lubricated and passed down the urethra as far as the cut off muscle. It is then moved slowly back and forth over the canal. If stricture or marked infiltrations are noted they must be recorded. You will at times find a congenital narrowing of the meatus which may produce obstructive symptoms.

Following this procedure the deep urethra should be explored. A definite hang will often be noted where a prostatic bar is present. This will produce exactly the same jumping over an obstacle effect as does the anterior infiltration or stricture. A little practice with this procedure will convince you of the valuable information obtained in this way. The rectal examination is now made. We find the most advantageous position for this procedure to be an extreme knee chest position with the patient on a table. Those of us who are endowed by nature with long fingers will anoint the index finger well with vaselin and introduce it slowly to the prostate. Its size and density are now noted. Particular attention should be paid to the condition of the median raphe. In many cases of benign hypertrophy it is still present while in carcinoma it is frequently obliterated. Now pass up to the very center of the upper prostatic union. From that point we slowly work the finger out along the cornices as it were until we reach the prostatic wings. Here we usually find the seminal vesicles lying on the posterior surface of the bladder. The importance of feeling the vesicles will be stressed later. We shall now proceed to a cysto urethroscopy. When we enter the bladder care should be taken to study the prostate from every angle in the bladder particularly by right angle vision and in the urethra by both right angle and direct vision.

In this way we will have an accurate picture of the prostate and the prostatic lobes. An endoscopic type of instrument is particularly valuable for studying intra urethral intrusion of the prostate.

After a thorough study of the organ it may become evident to us that there is no definite enlargement of the prostatic gland *per se* but that there is another obstruction at the vesical neck. This may be a pedunculated projection on the floor of the urethra known as an enlarged subcervical gland. There may be a definite cystic obstruction as in the cases reported by S. Lubasch and C. L. Deming. By far the more common obstruction in our experience is that of true median bar.

What is a median bar? In sharp contrast to prostatic hypertrophy or adenoma as some call it the disease is strictly an in-

inflammatory formation. What is the cause of this inflammatory condition at the vesical neck? We have no hesitancy in saying that it is undoubtedly a sequelæ of an old gonorrhea. A very small percentage of our gonorrhea patients are cured. The disease remains largely in the deep urethra and in the course of

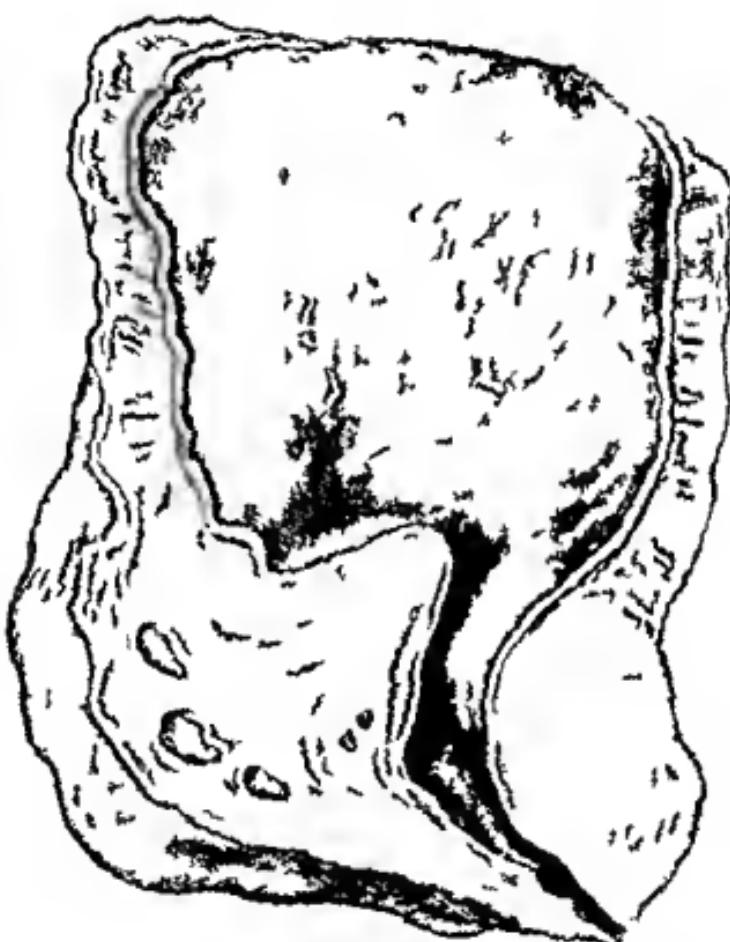


Fig. 154.—Sect. 6. Vesical neck well developed in disease.

year we find an inflammatory condition extending from the prostate up into the vesical phincter forming a very definite bar or ridge. These bars may simulate small median lobes or they may gradually extend all around the vesical neck forming a true collar obstruction.

Do these median bars always produce symptoms? Appar-

ently in some instances even when of quite good size no symptoms are noted. In practically all however there is a definite fibrosis of the vesical neck, the deep urethra particularly in and about the verumontanum also shows definite connective tissue changes. The prostatic urethritis which is always present undoubtedly is a big factor in the production of symptoms of prostatism.

**Case III—J. W.** white aged forty seven, married native of United States

*Chief Complaint*—Nocturia and frequency during the day

*Family and Previous Personal History*—Not important

*Urologic History*—In his previous urologic history he admits having had a gonorrhea about twenty years ago. This was followed by an old gleet. This however dried up as he says after a number of years. When he reported to us recently he stated that for several months there had been a gradual increase in frequency of urination. Regarding this he visited a surgeon who examined him by rectum and found his prostate apparently enlarged. On being catheterized he was found to have about 6 ounces of residual urine.

A diagnosis of prostatic hypertrophy was made and the patient scheduled for operation. He refused operation and came to our clinic.

*Physical Examination*—Patient is a pale rather poorly nourished man who looks much older than he is. He states that he has voided at least every hour for the past twenty four but still feels full. Patient has also dribbled a little at times and his underwear is quite wet.

Urethral examination revealed no evidence of obstruction until we reached the vesical walls where we detected what we called an undoubted hang. Rectal examination showed the prostate slightly enlarged but by no means very firm. Cystourethroscopy showed what we might call a curtain extending across the vesical neck, a distinct pouching being noted in the bladder behind it and a marked sulcus in the urethra below it. There is nothing to suggest a prostatic hypertrophy. We are

dealing with a typical median bar of considerable size. This condition is evidently the formation over a number of years of an old Neisserian process. What shall we do for this man?

Treatment.—Many procedure are used for the relief of this condition. To Young we owe the credit of devising a successful punch operation for many of these conditions. These have also been devised by Rose McCarthy *et al*. Stevens and Bugbee have been very successful with electrocoagulation. This latter is undoubtedly a valuable procedure. Over a period of about two years it has been our fortune to treat a number of these cases.

For the removal of these bars we have found the electrotome of Clyde W. Collings most efficacious. We administer sacral anesthesia. A McCarthy panendo cope is then introduced into the bladder. Through this an electrically cutting instrument is passed and a V shaped piece is cut out of the floor of the bladder neck. Cuts are made at 5 and 7 o'clock. These are carried to a depth of 1.5 cm. and of a length sufficient to reach the verumontanum. By turning the cutting knife blade laterally the two incisions may be joined. A small wire was originally used to ream out the core but this is no longer necessary. Doctor Colling tells us aptly that often through the 2 incisions one may look from the verumontanum down the valley and view the trigone. In our hands it has proved a valuable addition to the armamentarium and a considerable advance in bladder technic.

#### PROSTATIC ABSCESS

Case IV.—We are presenting this case because of an interesting error in his treatment.

J. M. white aged fifty six married native of Roumania. This man reported at the City Hospital Dispensary.

He stated that about one week ago he noticed a thick yellowish white urethral discharge with severe burning on urination. He denied all rambles from his own fireside. Examination however revealed gonococci in abundance. Our patient was told to rest up and was given the usual list of instructions. He was also given oil of santon 1  $\frac{1}{2}$  three times a day and 5 per cent

protargol as a urethral injection. Three days later Mr. M's wife appeared with a urethritis and a cervicitis, the blame for which she placed on her husband.

One week later the patient returned to the hospital because he was having difficulty voiding urine. An examination of the rectum told us that we had to deal with a prostatic abscess. In view of the urethral discharge still loaded with gonococci we tried to avoid operative procedures. The patient was given diathermy to his prostatic area. At home he was advised to apply heat constantly to the perineum and to use a hot Sitz bath frequently. About midnight recently he attempted to pass urine but was unable to do so. He became excited at once and taxied over to one of our largest hospitals where he was said to have been examined. He was asked a few questions by the surgeon and the usual speedy prostatic examination was made with a finger in the rectum.

In view of his apparent age, urinary difficulty and an enlarged prostate a diagnosis of prostatic hypertrophy was made. No thought was given the urethra from which a profuse discharge was undoubtedly exuding.

Without any further ado he was given ether and a one stage prostatectomy planned. The patient informs me now he told the surgeon that Dr. Pugh believed he had an abscess in the prostate. This was waved aside. A suprapubic incision extending from the symphysis to the umbilicus was made. The bladder was opened and an attempt made to remove the prostate. As it could not be done no adenoma being present. A large prostatic abscess was opened and the diagnosis changed to suppurative prostatitis. In two weeks the abdominal wound healed and he returned to us.

He has now lost considerably in weight and strength. He void a little urine about every half hour during the day and hourly at night. The urine contains large chunks of pus, mucus and blood clots. Our patient is very much worse off than he was before.

This case presents a very interesting problem. What shall we do with him? You may say bladder irrigation and pro-

tatic mas age. One of the doctors on the service tried that yesterday but was unable to enter the bladder even with a silk catheter. Our plan will be to do a perineal section, scoop out the cavity or cavities in the prostate with the finger and insert a perineal drainage tube of the Otis type into the bladder. We believe the patient will get well by this method.

Do we open our prostatic abscesses by the intra urethral method or by a perineal trocar? No we do not. These technics have apparently proved highly efficient in the hands of those skilful surgeons who devised them. In most of the cases tried however we have later had to do a perineal section. We have been told this is because our patients had a periprostatitis. This may have been so.

#### STRICTURE OF THE FEMALE URETHRA

Another group of cases commonly called rare but which we find fairly frequent is that of stricture of the female urethra. The historic archives hold out scant information on this subject but it was apparently first described by Fabricius in the old anatomic school of Padua. It was first considered as a surgical entity by Lisfranc in 1824. While it is generally taught that this condition is rare we have never been quite convinced of it. Some little time ago when preparing a paper on this subject we examined more than 3000 gynecologic and urologic records in this country and abroad. To our great surprise we found only 5 cases definitely diagnosed as stricture of the female urethra. Analysis further revealed that they were all lesions very easily diagnosed. One a carcinoma, one an obstetric tear into the urethra and 3 cases of marked gonorrhreal infiltrations. One very interesting point has been brought out by Hunner and that is he found 60 per cent of women suffering with ureteral stricture to have a urethral lesion as well. Bugbee in discussing a paper of ours before a New York Medical Society stated that in his opinion urethral stricture in women is quite common.

Stevens of San Francisco tells us that he has found many cases of urethral stricture in 169 females examined urologically. In a report published in 1924 I reported urethral stricture in

35 out of 180 women presenting themselves for urologic treatment. In a second report to the American Medical Association we noted 86 in 460 examinations. Since the above was written the numbers have increased greatly. Most writers stress the point that occlusive lesions are rare and with this dictum in mind few look for it. Please do not accept a statement that anything is rare. The willingness to accept the ideas of others has been the great stumbling block to medical progress. When the cystoscope and pyelography were first introduced they were denounced by some of our most conspicuous men. These were soon compelled to fall in line.

**Etiology**—What is the cause of urethral stricture in women? In most of the cases reported we find childbirth and catheter injuries appearing. Neoplastic disease and lupus are particularly conspicuous. We believe that most investigators have gone a little too far afield in their search for causes. If we only take the more common causes first we are certainly much less likely to err. What little offender should we think of first when treating disease of the urinary or sexual organs? Most certainly it would be the gonococcus.

In discussing the subject of gonorrhea in women with physicians it is surprising how few think of a urethral infection as associated with a cervicitis. In our office we often see cases of gonococcus infection limited to the urethra and many in which the urethral infection is overlooked entirely. To what extent is a urethritis associated with a gonococcus vaginitis or cervicitis? In the available literature we find the reports varying between 33 and 95 per cent. In our experience the latter is the more nearly correct. There is one variety of urethral infection that is often particularly severe namely the gonococcal honey moon urethritis. By this we mean the infection of the virgin bride by her husband who thinks he has been cured of his gonorrhea. We believe that the frequency is of sufficient importance to stress the gonococcus as a cause of stricture of the female urethra. It is practically always the cause.

**Pathology**—Urethritis practically always becomes chronic. Many are not seen and not cured. Our knowledge of the path

*Average Caliber of Urethral Strictures in Females*

F 150 m strictu s	1
N 8 F	3
N 12 F	10
N 14 F	21
N 16 F	17
N 18 F	13
No 20 F	11
No 22 F	10

This group of 86 cases I believe will be found to be fairly representative

**Location** — The lesion may involve the entire urethral canal or be located in any one portion. The involvement of the anterior urethra particularly at the meatus is decidedly the more common. In the 86 cases noted above 52 were at the external meatus, 24 in the anterior third, 3 in the middle third and 7 in the posterior third.

**Diagnosis and Prognosis** — Stricture of the female urethra as a definite entity must be recognized. Its effects if allowed to run on are exactly similar to those in the male. With inspection, palpation, the use of the bulbous bougie and urethroscopy there should be little difficulty in establishing a diagnosis. As regards prognosis soft infiltrations usually respond well to treatment. With the presence of dense infiltrations a little greater element of doubt is cast into the problem.

**Case V** — Mrs. J. B. colored married aged fifty six

**Chief Complaint** — Pains over renal areas and inability to hold urine.

**Family History** — Very cloudy

**Previous Personal History** — Had measles and diphtheria in childhood. One child, three miscarriages. Otherwise healthy.

**Present Illness** — About three months ago she began to have paroxysmal attacks of asthma for which she was treated in the institution. An examination of her blood at this time revealed a 4 plus Wassermann. Blood pressure systolic was recorded as 180.

About one month ago she confided to the doctor that she was unable to hold her urine saying also that it frequently leaked away in small amounts. This has since become most annoying as her clotting is wet almost constantly. An obscure pain over both kidneys has also become quite pronounced.

An examination of this patient as you will note, shows pain over both renal areas. In addition to this there is distinct abdominal distention between the umbilicus and symphysis pubis. This is evidently a distended bladder and the dribbling of urine therefore is undoubtedly the incontinence of retention. When we arrive at the urethra you will note that it is extremely small in size. In fact the meatus is pinpoint. We have what suggests a stricture of the meatus. You will note that with little difficulty we can introduce a No. 10 bougie a boule for a very short distance where it seems to be grasped and will go no further. On passing a No. 5 urethral catheter it enters the bladder with a little difficulty. The condition of the canal suggests that the stricture while giving a bang effect at the meatus extends further back into the canal. The presence of a 4 plus Wassermann reaction in this case is worthy of note. We have never seen a definite luetic urethral stricture but have seen considerable syphilis of the bladder. In this connection however it may be of interest to note that several years ago a series of cases was presented before the London Obstetrical Society of luetic origin. It is impossible to urethroscope this case. Our diagnosis must rest entirely on our inspection, palpation and use of the bulb.

What shall we do for this woman? In the first place we shall see that she is given a thorough course of antiluetic treatment.

Second we shall leave the No. 5 urethral catheter in place. It will decompress the bladder slowly a condition highly to be desired in this case. In forty eight hours we shall try again with a larger size catheter. If this passes three days later she will be given a No. 10 catheter and then we shall be able to start on the Hegar or Pratt dilators. We shall dilate her two <sup>size</sup> a week until we reach No. 30 or 32 F.

What shall we do in cases of stricture that are of very <sup>size</sup> 32 F.

caliber and which we cannot dilate? We have never been very enthusiastic over internal urethrotomy. Here is a case however where it may be used to advantage.

A fishform is introduced through the stricture and a Rand tunneled knife threaded over it. You have perhaps never seen a Rand knife. It is indispensable to one who has to deal with old almost cartilaginous urethral strictures.

Just beyond the point of the round knife you will notice there is a small ring. When the fishform is introduced and passes the stricture the ring is threaded on that instrument. This being done the knife is pressed forward and will pass through the stricture. Urethrotomy is however a procedure to be avoided as much as possible in the male or female. When the fibroid tissue of the urethra is incised in these cases re-proliferation is always very rapid. As a result of this many cases are in a short time worse off than they were before. Another alternative to which one is sometimes driven is that of suprapubic cystotomy and retrograde catheterization. This may seem like quite a major procedure. It is however much preferable to the external or vaginal urethrotomy recommended by some. We do not believe this case will require any very radical treatment.

This series of cases has been exceedingly interesting to us and though we have delayed you longer than expected I know that you have been interested. In closing let me emphasize one point. None of the cases is by any means rare.

## CLINIC OF DR G S DUDLEY

### BELLEVUE HOSPITAL

#### CHRONIC PRODUCTIVE INFLAMMATION OF THE ABDOMINAL RETROPERITONEAL FIBROFATTY TISSUE

THIS patient Mrs G S aged twenty six was admitted to the Second Surgical Division of Bellevue Hospital on January 12 1927 complaining of severe sharp localized epigastric pain associated with nausea and vomiting. She stated that she was taken ill similarly on December 11 1926 but recovered spontaneously. On December 14 1926 she was again taken ill in the same manner and removed to the Broad Street Hospital where laparotomy was performed one and a half hours after admission. A communication from the Broad Street Hospital dated January 17 1927 is to the effect that her operation consisted of a laparotomy for a cystic right ovary and the freeing of adhesions. The wound healed by primary union and she was dismissed from this hospital at her own request on December 24 1926.

The patient is married has had two children who are living and well and two induced abortions. In 1919 she had an appendectomy and a right sided ovarian cyst operated upon. She suffered from whooping cough and pneumonia but has had no other infectious disease. Her general health has always been good.

During the month preceding her admission to the hospital however she has had a slight cough but no hemoptysis. She has been losing weight for the past three months. She claims to have suffered from indigestion for the past year and a half.

**Physical Examination** —An adult female white whose temperature on admission was 101 F with a corresponding elevation of pulse rate. Blood count 14 000 leukocytes with 82 per

cent polymorphonuclears and 4300000 red blood cells with 80 per cent hemoglobin. Her Wassermann reaction was negative. There were a few fine rales at both pulmonary bases posteriorly but no other abnormal finding outside of the abdominal examination.

The lower abdomen showed a firmly healed scar of a recent laparotomy. The upper abdomen appeared full but there was no general distension. Palpation of this region revealed a sense of resistance in the epigastrium and extending into the right upper abdominal quadrant. This resistant area gave the impression of an ill-defined mass moderately tender to palpation and extending 1 to 3 inches below the costal margin on the right side.

Were it not for the fact that the epigastric portion of this mass seemed to be separated from the right upper abdominal portion of it one might suspect that it was an enlarged liver.

Radiographic examination showed no changes in the thorax and radiographic examination of the gall bladder after the ingestion of dye showed no shadow of gall stones nor was the gall bladder visualized. Radiographic examination of the gastrointestinal tract revealed the presence of a small ulcer involving the lesser curvature of the pars media of the stomach.

During these examinations the patient was treated expectantly and her temperature subsided to normal on the fourth day after admission to the hospital. Coincidentally with the subsidence of her fever the palpable epigastric mass diminished distinctly in size until it could no longer be outlined. On January 25, 1927 she suffered an apparently typical attack of biliary colic with a return of the upper abdominal muscular rigidity.

In view of the radiographic diagnosis of gastric ulcer it was considered advisable to perform an exploratory laparotomy.

At operation under gas oxygen ether on February 4, 1927 the gall bladder, stomach and pylorus were found normal. Beneath the posterior wall of the stomach extending from the median line to the left as far as the cardiac extremity of the stomach was an extremely hard nodular mass firmly adherent to the posterior abdominal parietes. Removal of this mass was evidently impractical and so a portion was removed for diagnosis.

During the dissection and removal of this fragment of the tumor a small quantity of distinctly purulent fluid was seen. A culture and smear taken from this fluid failed to grow any organisms in the first instance and failed to show any organisms by staining in the second instance. The abdominal cavity was closed without drainage.

Convalescence was quite uneventful except for an attack of pain on her eighteenth postoperative day which seemed identical with the attack she had had prior to operation.

Histologic examination of the fragment of removed tissue showed it to consist of small pieces of fat and areolar tissue containing masses of cells characterized by large polygonal cell bodies slightly granular or foamy cytoplasm and small vesicular nuclei. Occasional giant cells containing two or three large nuclei and a number of cells resembling Langhans' giant cells were found but there was no suggestion of tubercle formation. In the masses of embryonal fat cells were interspersed fibroblasts, round cells and capillaries. Occasionally eosinophilic leukocytes were seen. No mitotic figures or areas of necrosis were found.

The histologic diagnosis was chronic productive inflammation in fibrofatty tissue.

In 1917 Dr. Douglas Symmers<sup>1</sup> published an article describing a rare type of chronic productive inflammation in embryonal fatty tissues, an instance quite comparable to this present case. The only other similar instance recorded up to that time was one by Whipple<sup>2</sup> whose patient suffered from a great loss of weight and strength and a great abundance of neutral fats and fatty acids in the stools. At postmortem examination anatomic changes showed enlargement of the intestinal villi with extensive deposits of neutral fats and fatty acids in the lymph spaces plus infiltration of the interglandular connective tissues by mononuclear cells morphologically identical with embryonal fat cells and the presence of multinuclear giant cells. Symmers' conclusions were that the histologic changes thus described are unique and while he recognized the possibility that the condition was in the nature of an inflammatory

process nevertheless he was impressed by the possibility that such a lesion might undergo malignant transformation

Under such circumstances it is extremely important for this patient to be carefully followed and frequent observations of her condition made. Should there be any possible error in the histologic diagnosis and should the condition in reality be retroperitoneal lymphatic tuberculosis surely it would be reasonable to suppose that diminution or disappearance of the palpable epigastric mass would not be expected.

During the past year this patient has suffered at least three or four attacks of pain which from her description are indistinguishable from the type of pain she had preceding her operation. Nevertheless the epigastric mass has completely disappeared as far as abdominal physical examination is concerned and the patient has gained weight.

Because of her former radiographic diagnosis of gastric ulcer a repetition of the gastro intestinal series was done on January 13 1928. The result of this re examination showed no evidence of gastric or duodenal ulcer.

*Follow up Note* (February 2 1928) — Cholecystography after intravenous administration of dye shows gall bladder filled and it empties itself normally. No biliary calculi visualized.

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- 2 Whipple Bill Johns Hopkins Hospital 1907 p 382

## BRODIE ABSCESS OF THE TIBIA

MR F D, thirty eight years of age was admitted to the Second Surgical Division of Bellevue Hospital December 18 1926 complaining of pain in the lower third of his left leg

This pain began spontaneously in October 1926 and there is no history of injury or antecedent difficulty in this or other extremities. The pain is dull and aching in character but not constant. It is more marked at night and interferes with his sleep. Four weeks before entering the hospital he noticed slight swelling in this region for the first time and noticed too, that this swelling was increased by walking.

Physical examination revealed a very well developed healthy adult male white all of whose findings were normal except for the left lower leg. At this site there was a moderate diffuse poorly outlined swelling markedly tender to palpation. The patient's temperature was normal on admission but rose to 99 F on the second day. His Wassermann was negative and the urine examination normal.

Radiographic examination of the involved area showed a circumscribed area of rarefaction in the lower third of the tibia with considerable periosteal infiltration of the cortex and beginning involucrum formation.

### Radiographic Diagnosis — Bone abscess

Because this patient was extremely anxious to spend the holidays at his home he was permitted to leave the hospital with the admonition that he walk as little as possible. On December 27 1926 he returned to the hospital stating that despite the greater care he had suffered more severely than ever and had noted even greater swelling of the involved leg. On his readmission his temperature was 99.1 pulse 80 and there was distinct increase in size of the swollen area.

Temperature in this area was warmer than the corresponding area of the right leg and there was slight redness of the skin. No fluctuation present.

Operation—Gas oxygen ether December 28 1926 with a tourniquet applied to the thigh. There was found a localized subperiosteal abscess containing about 15 drops of thick white pus. The tibial cortex immediately beneath this abscess was porous in nature and riddled with multiple minute cloacae. Removal of this pugnacious bone disclosed a well localized sphenical abscess cavity about 1 inch in diameter and containing thick pus under moderate tension. The walls of the abscess cavity were lined with granulation tissue and the cavity was thereby completely isolated from the marrow cavity of the tibia. Culture of the evacuated pus showed *Staphylococcus aureus*. The bone abscess was drained and treated by irrigation with Dakin's solution.

Twenty two days after operation the patient was discharged with the wound almost healed. By March 6 1927 the wound had completely healed and the patient was free of symptoms.

Microscopic examination of the bone removed at time of operation showed chronic productive osteomyelitis.

This case would apparently represent a typical example of the bone abscess originally described by Brodie.\*

When speaking of the type of bone abscess originally described by Brodie it is important to bear in mind the site of such an abscess. True Brodie abscess occurs in the cancellous bone at the upper or lower extremities of the shaft of a long bone and is not dependent upon a preceding infection of the bone. Localized pyogenic bone abscesses occur elsewhere in the shaft of a long bone and are usually dependent upon antecedent osteomyelitis. The following case history will serve to illustrate this type of abscess.

Mr. S. H. aged twenty eight was admitted to the Second Surgical Division of Bellevue Hospital November 15 1926 with the story that on November 1 1926 she began to suffer from pain in the middle portion of the right tibia. This pain was of a constant and severe nature but was more aggravated at night. A few days after onset of the pain she noted an area of redness of the skin over this region.

Her further history is that twenty years ago her right tibia was operated upon apparently for acute hematogenous osteomyelitis. The operative wound drained for a long period of time and finally healed. The condition flared up shortly after the birth of her first child ten years ago and as in the first instance the wound drained for a considerable period of time and finally healed remaining healed until the present time.

Physical examination showed a well nourished well developed adult female white with normal findings except for the local condition. The anterior aspect of her right lower leg showed a firmly healed scar extending the entire length of the diaphysis of the tibia. At about the middle point of this scar was a circular reddened area approximately 2 inches in diameter which was warm to the touch and exquisitely tender to palpation.

Patient's temperature was 100 F white blood count 7000 with 60 per cent polymorphonuclears.

Radiographic examination showed evidence of healed osteomyelitis of the middle third of the right tibia characterized by marked widening and sclerosis of the bone but no cloacæ and no sequestrum.

Following her admission to the hospital all the evidences of acute inflammatory reaction except the pain subsided. Because of the persistence of pain she was operated upon on November 27, 1926 under gas oxygen ether anesthesia. The cortex of the tibia immediately underlying the painful area presented a porous appearance whereas the surrounding tibial cortex was of ivory like nature. No structure identifiable as periosteum was seen and there was no pus external to the cortical bone. Beneath the porous cortical bone was found a cavity 1 cm in diameter containing granulation tissue and 1 or 2 drops of white inspissated purulent material. The culture of this pus showed *Staphylococcus aureus*.

The abscess cavity was drained and the patient was allowed to go home on her eighteenth postoperative day.

**Postoperative Note**—Progress satisfactory and the wound was completely healed by March 6, 1927.



## SPINDLE AND GIANT CELL SARCOMA OF THE LOWER END OF THE RIGHT TIBIA AND FIBULA

THIS patient a man fifty eight years of age entered the Second Surgical Division of Bellevue Hospital on April 6 1925 He had had pain and swelling in the region of his right ankle for the past year His only history of trauma was that he had



Fig 155.—Spindle and giant cell sarcoma of the lower end of the right tibia and fibula

turned this ankle three years previously Restoration to normal followed three months of supportive strapping

Examination showed a soft rounded smoothly contoured well outlined swelling on the lateral aspect of the right ankle measuring about 6 x 4 x 2 cm Its posterior border was in contact with the external malleolus The skin was movable over

the tumor but the tumor was not movable upon the deep structures. There was no egg shell like crackle or evident enlargement of the superficial veins. There was considerable edema of the entire lower leg but no enlargement of the inguinal nodes or other evidence of inflammation. The x ray showed two areas of bone absorption one in the distal extremity of the



Fig 156

tibia and one in the distal extremity of the fibula. There were also visible a few calcific trabeculae in the soft tumor mass. Chest x ray showed a widening of the aortic arch but no metastases. x Rays of the remaining long bones showed no abnormality.

Preoperative Diagnosis - Giant cell tumor

Operation - With a tourniquet on the thigh patient was op

erated upon April 13 1925. The palpable tumor consisted of brownish friable neoplastic appearing material encapsulated from the soft parts and the ankle joint but continuous with tumor tissue in both the tibia and fibula. The barrier between the tumor and the joint however was so thin that it was broken through in the attempt at removal, thereby exposing the lateral aspect of the joint. It was impossible to decide from which bone the neoplasm had primarily arisen. The tumor tissue within the bone did not resemble currant jelly but was of a grayish white granular appearance.

Its removal left an ovoid cavity in the fibula 2 cm in length and 1 cm in breadth and a spherical cavity in the tibia 4 to 5 cm in diameter. A thin shell of articular cartilage effectually excluded the tibial portion of the tumor from the ankle joint. The cavities in the tibia and fibula left by curettage were treated with pure carbolic acid and alcohol and the tourniquet removed. A rather profuse ooze of blood was disregarded and the skin wound was closed without drainage.

A culture taken from the tibia proved to be sterile. The wound healed by primary union.

**Pathologic Report**—Dr. Douglas Symmers pathologic report was as follows:

Specimen consists of a piece of tissue measuring 5.5 x 4 x 2 cm and about 50-60 smaller bits of various sizes. All present the same appearance and are yellowish in color and friable in consistence.

**Microscopic**—Section shows two types of growth. In one the prevailing cell is a fibroblast which appears to be a rather mature cell. In places this fibroblast appears to be capable of developing strands of mature connective tissue. Among the fibroblasts are considerable numbers of atypical multinucleated giant cells. One can make out here and there in addition small numbers of thin walled apparently newly formed capillary vessels. In other places the ground substance is made up of mature looking fibroblasts scattered among which in about equal numbers are large giant cells of the type normally encountered both in the periosteum and endosteum. These cells

possessing multiple well formed small moderately chromatic individual nuclei. In some of the sections muscular and fatty tissues are to be made out and in the interstices are numbers of infiltrating tumor cells.

If one depended upon the histology alone to indicate the nature of the tumor and the prognosis one would be inclined to say the growth is non malignant and prognosis good. Histologic

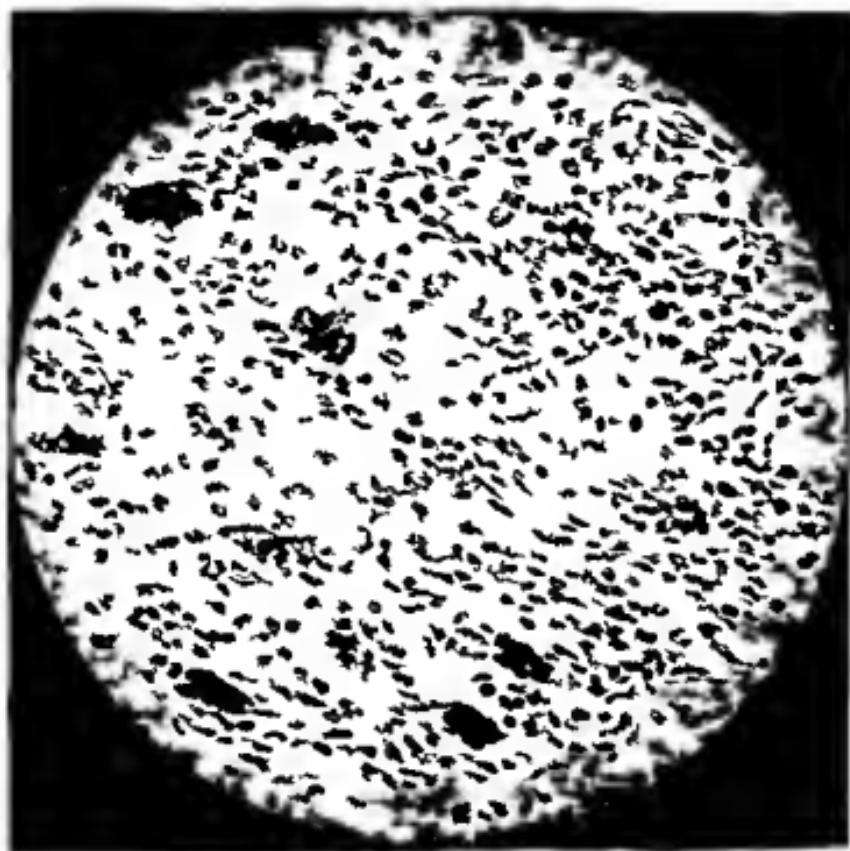


Fig 157

signs of malignancy however are notoriously unreliable. In the present case taking the man's age into consideration as well as the facts that the tumor was soft that at operation it was found to extend beyond the bony capsule and that clinically and histologically there are signs of infiltration of muscular and fatty tissue it seems to me the tumor must be regarded as at least locally malignant and that local recurrence is to be expected.

Although the question is one requiring exalted surgical judgment it seems to me that amputation ought to be seriously considered since there is no reason to think this tumor may not eventually metastasize to distant parts.

*Diagnosis*—Spindle and giant cell sarcoma

Doctor Ewing who saw the microscopic slides stated that in the absence of repeated surgical insults metastasis would not

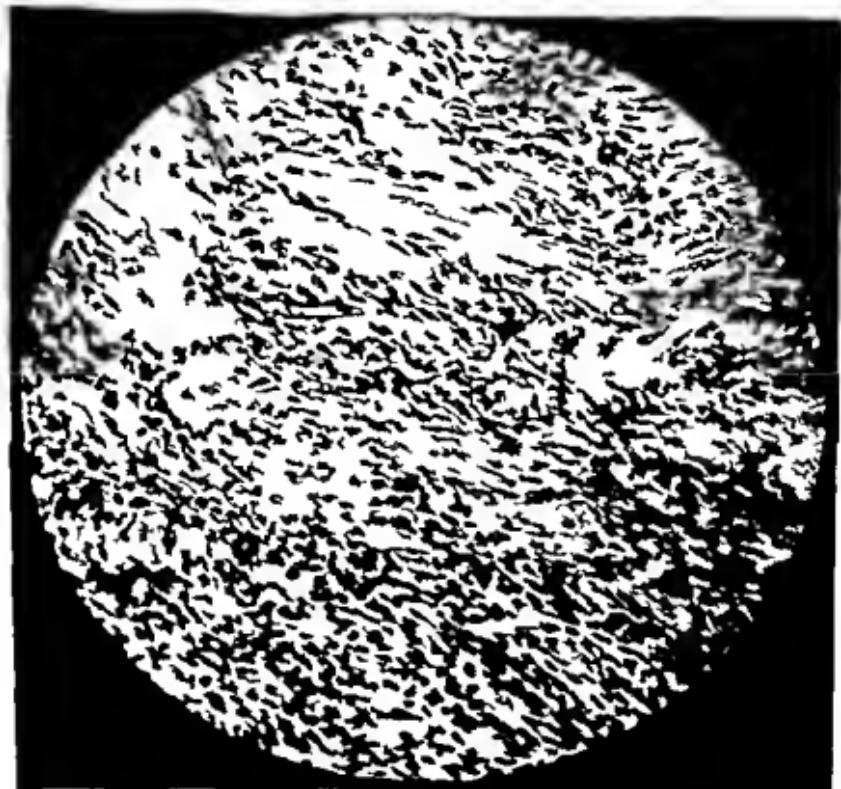


Fig. 158

occur although the lesion might recur locally and advised against amputation.

The uncertainty of the outcome and the prolonged convalescence to be anticipated as a result of conservative measures were contrasted for the patient with the comparative certainty and lessened period of invalidism to be expected following amputation. He chose to have the leg removed and an amputation

C. S. DUDLEY

through the middle third of the lower leg was done on April 25  
1926

This case presents three unusual features

- 1 The age of the patient
- 2 The location of the sarcoma
- 3 The apparent simultaneous involvement of two bones

Follow up --In 1927 the patient was well as far as his general condition was concerned but during that year he fell sustaining a fracture of the femur on the right side

## CLINIC OF DR J GOTTESMAN

FROM THE SURGICAL SERVICE MONTEFIORE HOSPITAL

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### CANCER OF THE BREAST

OUR present methods for treating cancer of the breast are unsatisfactory. Case after case presents itself in which operative treatment is carried out immediately after the discovery of a suspicious lump in the breast and yet the patient dies within a very short time after this procedure with recurrences and metastases. If our present concept of cancer as a local process in its early stages is correct then cancer of the breast from a technical point of view should lend itself to complete eradication. The results obtained are so discouraging that there is a wave of pessimism among the profession and the laity as to the efficacy of the radical operation. Is it justified? Why do we obtain so many failures in our breast cases?

On the Cancer Service of the Montefiore Hospital we have an unusual opportunity of observing all the late manifestations of cancer. In studying the cases in retrospect we have attempted to analyze the mistakes that have been made in the management and to determine the probable reasons for some of the failures.

The mismanagement in many cases is due either to the patient or the physician. The average patient does not detect the tumor in its early stages or procrastinates for months after its discovery. Further delay is directly attributable to the physician who first sees the case and advises local applications or other temporizing measures. And finally some of the responsibility is the surgeon's who operates without making a thorough study of his patient prior to operation.

Before proceeding with this discussion certain important features must be emphasized.

1 The term cure should be eradicated from cancer literature. We may speak of arrests only as recurrences may and do occur at any time.

2 The average duration of life of patients suffering from all types of unoperated cancer of the breast varies from three and two tenths years to four years after the discovery of the tumor. This average includes patients of all ages.

3 According to a recent report by Daland from the Massachusetts General and Huntington Memorial Hospitals about 22 per cent of all untreated cases of carcinoma of the breast are alive at the end of a five year period of observation.

4 Reports of arrests of less than five years duration are valueless for statistical purposes as untreated cases have a natural duration of life of from three to five years.

5 The average duration of life after a radical operation is about five years. There is thus on the average a gain of about one year between operated and unoperated cases.

6 When a radical operation for breast cancer is carried out in the presence of contraindications such as fixation of the tumor to the underlying chest wall skeletal or visceral metastases fixation of the axillary lymph nodes involvement of the supra clavicular nodes or edema of the arm it shortens the life of the patient. The general experience of many observers has been that such patients live longer without any operation but that a simple mastectomy gives a longer lease of life than a radical operation.

An analysis and criticism of the available statistics on cancer of the breast is helpful and instructive. I have collected in Table 1 the reports of various observers on series of cases in which the radical operation was performed for presumably operable carcinomas. The results obtained particularly at the end of five year periods of observation approximate very closely the results obtained in untreated cases and in some instances fall below that figure. These figures however represent a heterogeneous mixture of all types of cases of all ages with and without axillary involvement and all types of pathology.

Table 2 shows the result of a statistical study in which the

TABLE 1

A th	D t	f pape	N	C %	P	cc t 1 3 years	P	cc t 1 5 years
Watson Cheyne		1896	21			57 1		
		1899	61			51 0		
		1904	31			50 0		
Warren	1904		100			33 0		
Ste nthal	1905		145			33 0		
	1912		200			30 5		
Halstead	1907		191			38 3		30 89
G eenough	1907		260			28 7		22 9
	1921		69			41 2		30 5
	1907		80			35 8		30 0
Linde berg	1914		153			42 1		31 4
Schwartzkopf (1895-1910) (1904-1911)	1912		321			29 4		21 0
	1912		139			42 9		
Judd and Sistrunk	1914		266			44 7		39 8
Deaver and McFarland	1918		150			34 0		26 0
Hoffman	1920		315			36 3		28 5
Tichy	1920		67			38 7		20 9
Iselin	1920		102			44 1		26 4
Neher	1920		5			37 5		21 0
Perthes	1920		130			38 5		27 7
Fo gue	1921		285			40 3		
Sistrunk	1921		218			57 8		36
Mill	1921		125			49 2		36 8
Handley	1922					47 0		
Peck and White	192		118					39 1
P m ose	1923		49					44 4
Bunt	1922		341					26 9
Lee a d Cornell	1924		5					15 0
Leeds Hos p tal	1926		35			48 7		35 7
Guy Hos p tal	1926		338			54 1		28 4
Mosch w t	1926		89					34 0
Greenough	1926		16					36 0

cases have been classified according to the absence or presence of involved axillary lymph nodes. According to this classification there is a striking increase in the percentage of five year arrest. The recently published Leeds Hospital report which incorporates one of the most complete follow up studies of breast cases in recent years shows that 90 per cent of breast cases operated on before the lymph nodes were involved lived at least ten or more years after the operation. Thus it seems that the presence or absence of involved axillary lymph nodes is a most important prognostic sign.

TABLE 2

## RESULTS WITH AND WITHOUT LYMPH NODE INVOLVEMENT

A th	N. of	Gr d i 3 yr	I d i 5 yr	N ti 3 yrs	I ed i 3 yr	n
Dahl	83	20 3	15 7	0 8	66 6	
S strunk	218		18 9		63 0	
Guy's Hosp t 1	120	45 8	13 8	80 5	46 0	
Greenough	76		76 0		62 0	
Lo kwood					83 0	
Mills					63 0	
Lee and Co ell					33 0	
F umrose					91 0	
Leeds Hosp tal	3	38 1	20 0	94 0	91 3	
Leeds Hosp tal at ten years alive vol ed odes				5 8		
Leed Hosp tal at ten years vol ed n des				87 5 (35 ca )		

The following case histories illustrate cases in which errors of early diagnosis or treatment were made

**Case I**—A. B. aged thirty eight admitted May 28 1923 and died July 2 1923. In the early part of 1923 the patient



F b 159—F m C se I Show g p into ary met stas

detected a lump in the right breast and shortly after its discovery had a radical operation performed. She was well for two years receiving postoperative radiation during this time. In April

1923 she began to complain of shortness of breath and pains in the chest. Physical examination revealed pulmonary, skeletal and abdominal metastases.



F: 160 —From Case I. Showing metastasis to humerus and pathological fracture.

Case II—M. L. aged fifty one admitted September 10 1923 and died October 9 1923. Two years before admission she discovered a lump in the right breast and one month after its discovery she submitted to a radical operation. In July 1923 she developed stiffness of the upper and lower extremities. On physical examination she showed signs of a metastatic cerebral neoplasm. She died of generalized metastasis.

*Comment* — These cases are typical of many where radical surgery is instituted soon after the discovery of the tumor and yet within a relatively short time the patient dies of metastases. It is probable in the above cited cases that the tumor was present for a long time before its discovery and when found the patient was beyond the operable stage.

Repeated examples of delay by both the doctor and the patient frequently present themselves. The patient either refuses operation or the doctor delays early surgical treatment. Such delay makes the condition inoperable.

**Case III** — A. S. aged fifty two admitted November 9, 1921, died April 23, 1922. Five years before admission the patient noticed a mass in the right breast which she neglected for three years. She then consulted a doctor who told her there was no danger and gave her a salve to apply. One year after the medical consultation she submitted to a radical operation. Months after operation she developed nodules in the axilla and the right supraclavicular region. Physical examination on admission to this hospital showed regional and pulmonary metastases.

**Case IV** — A. G. aged fifty seven, admitted October 17, 1925 with a history of having noticed a lump in the right breast five years before entrance to the hospital. She consulted a physician who told her that the lump was nothing serious and advised massage of the breast. On physical examination she showed signs of generalized metastases.

October 17  
right breast  
consulted a  
physician  
and  
she

We want to present several cases in which operation was carried out in the presence of metastases.

**Case V** — R. S. aged thirty eight admitted May 1, 1925. In June 1925 she noticed a small lump in the left breast near the nipple. Eight months later she bumped her breast and

the door and developed a discharge from the nipple. At that time she became aware of pain in her back but had no difficulty in walking. In April 1926 a radical mastectomy was performed. Before the operation because of pain in her back an x-ray of the spine and pelvis was taken but was reported negative. Soon after the operation she developed radiating pains down her



Fig. 161.—From Case V. Showing metastatic involvement of spine

leg and was unable to walk. Physical examination on admission to the hospital showed an emaciated female acutely ill. There was marked tenderness over the lower spine and sacrum and partial paralysis of both lower extremities. An x-ray of the spine showed metastatic neoplastic involvement of the fourth, fifth and sixth lumbar vertebra and both wings of the sacrum.

*Comment.* Although a preoperative x-ray was taken and re-

ported negative insufficient attention was paid to the clinical evidence of spinal cord involvement and this case was operated upon when the condition was beyond the operable stage. This case clearly indicates that clinical manifestations of metastases as well as x-ray evidence should be considered in deciding the operability of a case.

Case VI--E. D. aged thirty eight seen November 1925 complaining of pain in her legs which had been attributed to flat feet. Pain began about two years ago and was followed by an increasing difficulty in walking. She also experienced tingling and sensations of numbness in her leg. On physical examination a mass was discovered in her right breast which had not been noticed by the patient. The regional lymph nodes were enlarged and there was tenderness along the lumbar spine. Complete x-ray study before operative intervention was advised. The patient immediately went to another surgeon who performed a radical operation without making a careful x-ray study of the spine and chest. The patient died three months after the operation of generalized metastases.

In spite of early discovery and immediate operation there are certain cases in which the radical operation shortens life. These are usually cases of inflammatory carcinoma which may occur at any age carcinoma in young women and carcinomata which develop during pregnancy. Inflammatory carcinomata are characterized by a rapid onset and growth with swelling, redness and tenderness of the overlying skin, streaks of lymphangitis and occasional rises of temperature. These three types of cases obtain a longer lease of life with radiation either x-ray or radium. In carcinoma complicating pregnancy the uterus should be enucleated at once.

Many observers believe that the pathology of the tumor has a very important bearing on the ultimate fate of the patient. Broders has conclusively shown that the degree of malignancy of a tumor can be determined by the histologic studies of such criteria as hyalinization, fibrosis, lymphocytic infiltration per-

centage of mitotic figures and the degree of cellular differentiation. By cellular differentiation is meant the amount of tissue which approximates in appearance the normal histologic structure of the tissue in which the tumor arises. The greater the degree of differentiation the less the degree of malignancy. He has made exhaustive studies on squamous celled tumors of the skin and can prognosticate the ultimate fate of the patient from the degree of malignancy. Other observers have attempted similar studies of breast carcinoma. Sistrunk and McCarthy believe that hyalinization, fibrosis and cellular differentiation are the greatest factors in postoperative longevity. Greenough in a recent study of breast cases concluded that the degree of malignancy is as important in determining the prognosis as the absence of involved axillary lymph nodes. He divided breast carcinoma into three degrees of malignancy high, medium and low and showed that cases of low degree malignancy with involved lymph nodes lived longer than cases of high degree of malignancy with uninvolved lymph nodes.

What can we do to secure better results in the treatment of these cases? Early discovery and operation before involvement of the axillary lymph nodes is of paramount importance. This can be facilitated by periodic health examination of the cancer susceptible areas such as the breast, rectum, tongue, mouth and uterus.

The radical operation should be performed only in cases where there are no contraindications such as enlarged supraclavicular lymph nodes, fixation of the breast to the chest wall, adherence of the axillary lymph nodes and skeletal or visceral metastases. Every patient should have a careful history and complete physical examination. Early detection of pulmonary metastases may be possible by noting alterations in breath sounds and the presence of rales. Bony tenderness of the ribs, spine, pelvis and long bones especially the humerus and femur may mean metastatic involvement. A neurologic status should be made to determine the absence of central nervous system involvement. Preoperative x-ray studies of the lungs, spine, pelvis and long bones are essential.

Every breast case should have a biopsy at the time of operation to determine the degree of malignancy. This can be done by studying freshly stained unfixed tissue scrapings directly from the tumor mass as suggested by MacCarthy of the Mayo Clinic. If the examination shows that the tumor is of a low degree of malignancy the operation may be done at once. If a high degree of malignancy is found the tumor should receive preoperative radiation in an attempt to convert a high degree of malignancy into one of lesser degree. This procedure has been suggested by various men inasmuch as radiation induces fibrosis, hyalinization, lymphocytic infiltration and destroys the actively growing cells.

We feel that better results will be obtained in breast carcinoma by the more careful individualization and preoperative study of each case.

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CLINIC OF DRs CHARLES MURRAY GRATZ IRVING  
SHERWOOD WRIGHT AND IAN MACKENZIE

NEW YORK POST GRADUATE MEDICAL SCHOOL AND HOSPITAL  
PHYSIOTHERAPY BY DR HERMAN G WAHLIG  
THE NORTH COUNTRY COMMUNITY HOSPITAL GLEN COVE N Y

ARTHRITIS MEDICAL AND SURGICAL TREATMENT

THE diseases most easily traced to antiquity have left their marks in bone pathology and thus we find that from its earliest dawn the human race has been marred by the presence of disease entities giving rise to ankylosis and other bone changes similar to those found in the arthritides of today. One of the writers has seen at the Laugerie Basse, Les Eyzies in the Valley of the Dordogne River bones from the Cro Magnon period showing definite arthritic changes. The specific etiology of course can not be established but we are in agreement with Osborn<sup>1</sup> when he stresses the extreme dampness of the cave habitations as a probable contributing disease factor in these bone conditions.

Many examples of deforming pathologic processes in the joints have been found in Egyptian bones thousands of years old. The Greeks and Romans were certainly familiar with these complaints and probably employed their well known hydrotherapeutics for relief. In the Pompeian Museum one may see bony examples of joint diseases and in the ancient town baths for hydrotherapy.

Scribonius Largus (A D 41) had specific terms for acute diseases of the joints and for gout and he also showed familiarity with other chronic joint diseases<sup>2</sup>.

Throughout the intervening centuries to the present time the terminology and classification of arthritic conditions have been hopelessly confused. At the end of the sixteenth century Baillou used the term *arthritus* to signify gouty conditions and

*rheumatism* to signify acute inflammation of the joints. In 1683 Sydenham<sup>3</sup> clarified the distinction between chronic rheumatism and gout but even yet clinicians of all countries are apparently unable to unite in using a single simple classification covering the arthritides as a whole. The classification of Nichols and Richardson<sup>4</sup> based on pathologic changes has recently come into favor for clinical use being adopted by Cecil and Archer<sup>5</sup> and recommended by Pemberton<sup>6</sup> and others. This divides arthritis into

- I Primary or proliferative—comprising about two thirds of the cases
- II Degenerative—comprising about one third of the general clinic cases as reported by Cecil and Archer

**I Proliferative Arthritis**—The first group shows marked changes in the synovial membranes and in the perichondrium. These cases tend to have acute exacerbations and ankylosis of the joints involved. They are usually of infectious origin occurring mostly in children and young adults and the disease may be regarded as a local manifestation either bacterial or toxic of a systemic condition. This group may be further subdivided as follows:

1 The specific type due to the invasion of the joints by a specific organism such as the tubercle bacillus or the Spirocheta pallida

2 Cases which are clinically of a chronic *infectious* nature and in which a definite focus may be discovered in tonsils, teeth or elsewhere

3 Arthritis following specific infections for example scarlet fever, measles and rheumatic fever

4 *Arthritis deformans* which may be regarded as a chronic type of proliferative *arthritis* of unknown origin

**II Degenerative Arthritis**—In this type the osseous tissues are soft and eroded in the primary stages of the disease and are usually enlarged in the later stages. The increased activity of the perichondrium results in bipping and irregular exostoses. The etiology has not been definitely determined. There is no proof of endocrine relationship although this has been claimed.

hy some authors. The patients are usually much older than those in the primary group. For clinical purposes this group may be subdivided into

- 1 Cases occurring with and following the menopause
- 2 Those of metabolic origin of which gout is a classical example
- 3 Mono articular degenerative arthritis following trauma
- 4 Senile arthritis quite common in very old patients

#### TREATMENT

The purpose of the present study is to correlate the medical and surgical measures which have given encouraging results in the relief of arthritis. It is hoped that a definite outline of treatment will help to clarify the situation and will suggest the manner in which the physician and the surgeon can best co-operate in restoring these unfortunate patients to a comfortable and efficient life. To this end the treatment may be considered as applied

- 1 To proliferative arthritis
- 2 To degenerative arthritis
- 3 Treatment including physiotherapy which has proved of value in both types

1 **Proliferative Arthritis**—The first step is the removal of all demonstrable foci of infection and the administration of specific therapy when indicated. Extremely gratifying results may be obtained if the focus is found and eliminated early. Pemberton<sup>6</sup> and Lillie and Lyons<sup>7</sup> advocate tonsillectomy in all cases of arthritis, the latter authors having found in a series of 200 consecutive cases of tonsillectomy for arthritis that the tonsils played an important role in about 79 per cent of them. It is difficult for even the best men to be sure that a tonsil is not a focus of infection. Autogenous vaccines often help to clear up the condition more promptly, especially if used in large dosage. Burbank and Hadjopoulos<sup>9 10 11</sup> have reported the presence of specific immune bodies in the blood of arthritic patients detection by means of the active serum action. Using the method of approach of these

requisite is to determine the complementary value of the patient's blood against the various known pathogenic strains of organism. Cultures are made from all available foci of infection and autogenous vaccines are prepared if pathogenic organisms are found. These are combined with the complement fixation strains when they correspond in character and type.

**Principles in the Surgical Treatment of Proliferative Arthritis**—(a) The etiology has been more carefully determined hence the prognosis is better than in the degenerative group.

(b) This type of arthritis tends to ankylosis and if preventive measures are not employed unfortunate deformities may ensue.

(c) As a rule the patients are adolescents or young adults hence all treatment must be conservative.

In the acute stage the treatment should aim at the prevention of deformity. The joint should be protected and put in a position of physiologic rest and any complication—such as synovitis for instance—should receive early attention. The measures necessary to attain these ends should be supplemented by local applications or other palliative treatment as indicated. Whether splints or circular casts are required to immobilize the joint and prevent deformity will depend upon the individual case. When circular casts are employed they should include the extremity distal to the joint immobilized and within twenty four to forty eight hours they should be split into anterior and posterior parts the posterior part being left *in situ* to support the limb. The removal of the anterior portion permits the early application of physiotherapy.

In the case of marked synovitis aspiration under aseptic conditions and cultures may be indicated if less radical measures have failed to control it.

Occasionally a patient is in such an acute condition that blood transfusion may be indicated.

In the subacute stage the restoration of joint motion by either occupational therapy or passive motion in gradually increasing degree is advisable. If adhesions persist manipulations under an anesthetic may be necessary. Splints or braces protect the joint and may be adjusted to allow a suitable range of motion.

In the chronic stage the treatment will vary from the less radical measures used in the subacute stage to surgical methods designed to increase motion or correct malposition such as arthroplasties or osteotomies.

**The Special Treatment of Certain Joints —*The Hip*** — When splints or casts are indicated in a case of infective arthritis of the hip the position of choice is usually abduction combined with moderate extension. Traction is of value at times. In the subacute stage a light Thomas hip brace usually suffices. Aspiration or incision should be resorted to only in extreme cases.

***The Knee*** — The position of choice for immobilization of the knee is 5 to 10 degrees short of complete extension. When aspiration is necessary the point of selection is just medial to the inner aspect of the lower third of the patella care being exercised not to damage the periosteum. In the case of a persistent synovitis it may be necessary to flush the knee with hot saline solution. Some authorities follow this by the injection of 6 c.c. of 5 per cent iodin.

***The Ankle*** — Arthritis of the ankle may be accompanied by marked synovitis and may also be complicated by flatfeet and spurs of the os calcis. Strapping of the feet in a varus position and the use of various forms of arch supports will be of material aid when these complications are present. In severe cases braces or casts may be necessary.

While no detailed treatment need be given for the other joints it is of prime importance to remember that the position of choice for physiologic rest in the wrist is moderate dorsiflexion in the elbow a position slightly less than a right angle with the fore arm held midway between pronation and supination for the shoulder moderate abduction.

**2 Degenerative Arthritis** — While this condition is not regarded as being of an infectious origin all foci of infection should be carefully sought and removed if found in order to increase the resistance of the body and relieve any aggravating conditions. A careful examination of the patient will usually reveal factors which require definite attention. In cases following the meno-pause the patients are often overweight thus throwing an ad-

ditional burden on the joints especially those of the lower extremities. In some cases the basal metabolism rate may be found to be moderately depressed. This may be increased by several measures described later. Other patients are subject to hypertension and may have varying degrees of pathology in the heart and kidneys. It is not within the scope of this article to enumerate the various measures necessary when these complications are found. It is presumed they will receive appropriate medicinal treatment. Physiotherapy when indicated may be started at once for very few are subject to acute exacerbations.

In arthritis of metabolic origin particularly gout special attention must be paid to the diet and palliative treatment lies almost entirely in the hands of the physician.

**Surgical Treatment of Degenerative Arthritis**—The measures necessary in this group will vary from the simplest form of support to surgical arthrodesis. To illustrate this the following procedures varying with the severity of the disease have been used with gratifying results in the treatment of degenerative arthritis of the spine (1) Adhesive strapping (2) corsets (3) a Knight brace (4) Taylor brace (5) plaster of Paris jackets. Ankylosis of the joint is rare without surgical intervention hence absolute immobilization may be maintained for longer periods than in the proliferative cases.

In the end stages of mono articular degenerative arthritis motion in the joint may become so limited and be accompanied by such severe muscular spasm that arthrodesis of the joint is necessary. Following the arthrodesis the relief of the muscular spasm and cessation of pain allows much greater motion in the neighboring joints and from a functional standpoint the patient has an actual increase in activity.

**Treatment Which Has Proved of Value in Both Types**—Non specific protein therapy has frequently given good results especially in acute cases. Typhoid vaccine—in injections of 10 000 000 increasing to 100 000 000—has been used without ill effects (Cowie and Calhoun<sup>8</sup>) though such large dosage is not favored by most authorities. Sterile milk in small doses and Coley's fluids have also been followed with good results in many

instances. The rationale of non specific protein therapy is not clearly understood at this time. The changes in the blood pressure indicate that the body defense reactions are stimulated. Before using the non specific protein therapy the ability of the patient to withstand its weakening effects must be carefully considered.

**Measures for Increasing the Resistance of the Body** — Since we regard arthritis as a local manifestation of a systemic condition it is of paramount importance that every effort be made to increase the efficiency of the body in combating the toxemia. Suitable measures may be briefly outlined as follows:

(a) Care of elimination

(b) Increasing the resistance of the body by, first general hygienic measures second transfusions in critical cases

**Elimination** — The four main avenues of elimination are the lungs kidneys gastro intestinal tract and skin. It is unnecessary to state the direct relationship between pulmonary lesions and tuberculous arthritis. The frequency of the involvement of the lung causing arthritis elsewhere in the body renders it necessary to examine the respiratory tract most carefully.

The main function of the kidneys is excretion hence they should be carefully checked. In general fluids should be forced to aid elimination through these organs.

The gastro intestinal tract may be regarded in two phases (1) As a harbor for a definite focus of infection—often in the appendix or colon and (2) stasis or marked constipation decreases the ability of the body to eliminate toxins and hence the disease may become progressive.

The role of the skin as an organ of excretion contributes to the success of institutions that advertise and obtain results in treating rheumatism and arthritis by means of baths with special kinds of charged water and in many cases—especially in Europe—by mud baths. At least partly their success depends on the elimination of toxins by increasing the efficiency of the skin and sweat glands through vasodilation of the superficial capillaries.

**Drugs** — Although in the past the treatment of arthritis with drugs has been unsatisfactory from the curative point of view

certain drugs have proved blessings in their palliative effects. The most widely used of these is salicylic acid and its modications. Their value for the temporary relief of pain is undebatable. That they have any permanent effect on the course of the disease is open to serious doubt.

*Sodium salicylate* is the form most commonly employed—the dosage being from 5 to 20 grains three or four times a day; this should be accompanied by an equal amount of sodium bicarbonate to prevent acidosis. Some authors—especially in England—have advocated the huge dosage of 200 to 300 grains daily but in general that is felt to be dangerous especially if any renal impairment is present. A great disadvantage in the administration of sodium salicylate is its tendency to produce intestinal upsets and resulting intolerance. This can be greatly lessened by giving the large doses in some vehicle—such as starch paste—by means of retention enemas.

*Ispirin*, *cinchophen* and *tolysin* have been used as substitutes, the latter especially being less prone to produce gastro-intestinal disturbances.

The iodids also have long been considered of value in the treatment of arthritis. *Potassium iodid* is most commonly employed in moderate dose—2 grains after meals or in gradually increasing doses. The effects are often slow to appear and there is apt to be a return of symptoms on cessation of administration. In the use of the simple iodid compound the danger of causing a thyroid imbalance must be guarded against. Recently iodin substitution products of benzoic acid have been reported by several men to be of definite value for the palliation and care of the arthritides. O-iodoxybenzoic acid and allied compounds were first described by Meyer<sup>12</sup> and his co-workers in 1897. Heinz<sup>13</sup> studied their action in the body and Loevenhart and Grove<sup>14</sup> further developed their preparation and studied their physiologic effects. Other workers (Arkin and Fink<sup>15</sup>, Amberg and Knox<sup>17</sup> and Hektoen<sup>18</sup>) contributed to an understanding of the physiologic effects of these compounds. The first series of cases in which O-iodoxybenzoic acid was used in the treatment of arthritis was reported by Young and Youmans<sup>19</sup> of the University

of Michigan. The series comprised 43 patients and included acute chronic and gonorrhreal forms of arthritis. Of these patients 56 per cent were reported as markedly improved 23 per cent moderately improved, 14 per cent slightly improved and 20 per cent unimproved. Smith<sup>20</sup> of Boston City Hospital reported early in this year a series of 32 patients treated with this drug. His cases included arthralgia,<sup>21</sup> acute arthritis chronic arthritis gonorrhreal arthritis and acute rheumatic fever. All but 3 of his cases showed some improvement as evidenced by lessened swelling or pain and improved function.

Trauba<sup>21</sup> reported a series of 31 cases with the following results 16 per cent markedly improved 16 per cent moderately improved, 32 per cent slightly improved, 27 per cent unimproved 7 per cent improved due to other therapeutics.

Cattell<sup>22</sup> has reported a series of 21 cases with varying degrees of improvement in all but 3 cases. The series included acute subacute and chronic infections and gonococcal arthritis. We have had encouraging results in our series of cases—as yet too small to report—with more than 80 per cent thus far at least moderately improved.

Up to the present the salt found to be most efficacious is the ammonium salt of O iodoxybenzoic acid. It comes in a white powdered form and is most beneficially administered intravenously in normal saline solution infused slowly allowing at least seven minutes to enter the vein. The patients should be hospitalized for two or three weeks during which time a series of six to eight injections is given. The reactions are quite severe consisting of burning of the mucous membranes abdominal cramps headache and often pain in the affected parts. There may be some rise in the temperature though a chill is rare. Improvement is noted in greatly decreased or abolished joint pains and decreased muscle spasm—which allow greater motion—and an improvement in the general condition. It may also be administered orally or per rectum and the results by these methods appear to be better than those from salicylates. The intravenous method however is greatly to be preferred.

This drug should be used only in conjunction with other

recognized principles of treatment as herein outlined and further work must be done to properly evaluate it

*Arsenic* has already been mentioned as being of considerable value in the treatment of arthritis—the rationale lying probably in its properties of speeding up the basal metabolism. It is usually administered in the form of Fowler's solution or better sodium cacodylate (—2 gr three times a day)

*Thyroid extract* has been of value for the same reason but at times its administration has been followed by grave phenomena of hyperthyroidism

**Operative Procedures Indicated in Various Stages of Arthritis**—1. Manipulation under an anesthetic followed in some cases by casts and later by physiotherapy

- 2 Arthroplasty
- 3 Arthrodesis
- 4 Osteotomy
- 5 Arthrotomy

1 *Manipulation under an anesthetic* is used mainly in quiescent cases where there is a limitation of motion due either to adhesions following acute attacks or to exostosis and lippling as the result of chronic inflammation. Some authorities have used injections of oil into the joint following the manipulation but this has not been generally accepted by the profession. In cases where adhesions are present motion and physiotherapy may be started immediately following the manipulation. In other cases in which this procedure is employed to correct the deformity a cast is applied to maintain the new position for varying period of time thus securing a better end result.

2 *Arthroplasty* is used in the chronic stage of arthritis where the disease has progressed to a marked limitation or complete ankylosis of the joint. In the degenerative type this procedure is employed mainly to increase the range of motion which has become markedly limited as a result of bony exostosis. In this type the operation is designed to remove any bony particles which are limiting motion. In cases where absolute ankylosis of the joint has occurred much more radical work must be done and some material is usually interposed between the bone end

to prevent their reuniting. The more common materials employed for this purpose are (a) inorganic transplants (b) muscle transplants (c) muscle and fat transplants (d) fat graft (e) fat and fascial flaps and (f) animal membrane. In a large series of cases W. S. Baer reports the best results following the use of animal membrane—usually suitably prepared pig's bladder—particularly in work on the jaw and hip. He advises a guarded prognosis following septic infections especially those following acid fast infection. In cases of *arthritis deformans* arthroplasty should never be attempted.

3 *Arthrodesis* should be regarded as the end stage in the treatment of arthritis. In cases where there is a marked limitation of motion accompanied by severe pain and muscle spasm but in which the neighboring joints are not involved in the process most gratifying results are occasionally obtained. The surgical fixation of the joint will often so reduce the muscle spasm that the increase in motion of the neighboring joints will give a much better functional result. A careful study should be made of the position most desirable and immobilization should be maintained by means of a plaster cast for at least ten to fourteen weeks.

4 *Osteotomy* is used mainly in cases in which the joint has been allowed to go on to ankylosis in an unfavorable position. For example in arthritis of the knee if extension is not maintained the flexor group of muscles will predominate and the joint will be in a semi flexed position. A supracondylar osteotomy will correct this malposition.

5 *Arthrotomy*—In the later stage of arthritis joint mice may be formed either from a hardening of the synovial membrane or from a protuberance of bony particles into the joint. Locking and great pain may result necessitating their removal. The site of incision must be carefully selected so as to give the widest possible exposure of the joint and permit a thorough exploration.

*Physiotherapy*—The following forms of physiotherapy have given most satisfactory results in supplementing the medical and surgical treatment of the arthritides.

*Massage*—This has been used from time immemorial and no

one doubts its value. Its employment however should be limited to the trained masseuse under medical supervision.

*Radiant Light and Heat*—This form of therapy is useful in prolonged application to the various joints. It relieve pain and gives marked palliative relief. The radiant light and heat apparatus is very simple to use. Lamps consuming less than 400 watts per hour can be connected to any lamp socket and can be safely used for hours at a time if not too close to the skin. If there is any danger of irritation or blistering the interrupted method may be employed the therapy being applied during alternate hours. For the treatment of the hip-joint where deep penetration is required lamps consuming 1000 to 1500 watts per hour are necessary. In all cases of arthritis radiant light and heat is the method of choice in beginning physiotherapy. Dr. Kinney of Wellsville has made a very careful study of light penetration through living tissues and finds that certain rays will penetrate a distance of about 1 inch. The differences between normal and diseased tissues should be kept in mind while giving these treatments and the reaction carefully noted. The comfort and toleration of the patient is the best guide for this. Physicists have shown experimentally that some of the virtues of radiant light and heat are due to the invisible infra red rays.

*Diathermy*—This form of therapy relies mainly on raising the temperature of the part treated. Dependable diathermy machines give adequate high frequency current with ample and sufficient oscillations to penetrate the tissues and produce the necessary heat within the joint. It is often used following the application of radiant light and heat. Two electrode are employed and if it is desired to concentrate the heat at one particular point they may be of unequal size the heat concentrating nearer the smaller electrode. The current should be gradually increased for the first ten minutes until the maximum is reached the average treatment requiring thirty to forty minutes. The sensation of the patient is the most reliable guide to the amount of current that can be tolerated while the exact amount of current passing into the tissues will be indicated by the millampere meter.

*Sinusoidal Current*—In subacute and chronic cases of arthritis where there is evidence of atrophy due to immobilization and toxic changes active and passive massage is of great value. As already mentioned the latter is best accomplished by the trained masseuse. The sinusoidal wave current permits the use of active massage and usually the treatment begins with about ten movements per minute, gradually increased to physiologic activity and tolerance of the part involved.

*Ultraviolet Rays*—As most patients suffering from arthritis are in need of constitutional treatment every effort should be made to improve the condition by suitable therapy. Ultraviolet rays have characteristic constitutional effects they act beneficially upon the mineral metabolism of the blood especially calcium and the phosphates. In the form of heliotherapy they have been utilized from the earliest times. When produced by mercury in quartz or carbon arcs they are very dependable and convenient and can be used at any time. As a rule the patient is stripped and placed on a comfortable couch with the light adjusted about 30 inches from the nearest part of the body. The patient is warned to keep the eyes closed or wears special glasses to protect them. It is best to begin the treatments with one minute exposure at this distance front and back the first day repeating the treatment every day and increasing the exposure one minute each time. In this way a troublesome erythema (sunburn) or unpleasant constitutional effects are avoided. Since most forms of arthritis are due to some form of infection the beneficial effects of ultraviolet radiation are often apparent after a few applications. There will be a noticeably marked improvement in the general health and frequently a rapid subsidence of troublesome and annoying symptoms.

Dr. Rollier of Leysin Switzerland has built several large sanatoria on the tops of snow clad mountains for the treatment of all forms of tuberculous bone affections and reports success by the use of these rays directly from the sun. When the sun's rays are not available he uses artificially produced ultraviolet radiation. For the treatment of arthritis complicated with sinuses or fistulous tracts daily treatments with quartz rods at

tached to a water cooled ultraviolet lamp will often produce a quick response and prompt healing.

*Hydrotherapy* -- This is another important branch of physiotherapy which will be found very serviceable in the treatment of various forms of arthritis. Hot and cold applications to the joints often give great relief. Baths and wet applications can be applied at home or elsewhere without any elaborate preparations but for the best effects we must depend upon the skilled physician who is trained in the proper technic.

The *whirlpool bath* is another very good method of physiotherapy in the treatment of arthritis and was used quite extensively during the war. One disadvantage is the large amount of hot water required for each treatment where many treatments are given daily in large institutions the expense of providing the necessary amount has to be considered. In the whirlpool bath the entire limb can be immersed at once the chief benefit derived from such treatments is the warmth imparted the pressure of the water on the skin causing a certain amount of friction and massage due to its rapid whirling this in turn acting favorably upon the capillary circulation and on the tissues.

The *paraffin bath* is used in the same way as the whirlpool bath except that the melted paraffin is ladled instead of driven around as in the water bath. Sometimes the temperature of the paraffin will rise to 130° F. and yet the patient feel very comfortable. Great care should be exercised that the temperature does not rise higher as the skin is easily blistered by a higher temperature. This method is much less expensive than the whirlpool bath.

*Colonic Irrigations* -- Many cases of arthritis may have their focus of infection in the gastro intestinal tract especially the colon. If they are further complicated by marked constipation elimination will be retarded. In these cases high colonic irrigations may supplement other indicated medical and surgical therapy and striking results have been obtained. Frequent examination of the feces should be made before and after such irrigations and the reactions whether alkaline or acid noted.

**Routine Examination** —The following procedure is suggested as an aid in the classification of cases

1 The history should be carefully taken. As these cases will be seen many times it will be found advantageous to note the condition of the patient at each examination.

2 A thorough physical examination complete in every detail including transillumination of the teeth and sinuses followed by x ray examination when indicated examination of the tonsils thorax abdomen vaginal and proctoscopic examinations as well as a thorough examination of the part or parts involved. Limitation of motion should be noted in degrees measurements must be taken to determine hypertrophy or atrophy of the part and any shortening must be carefully noted.

3 Consultation and further work on any foci found or suspected.

4 Urinalysis stool examinations blood chemistry Wassermann and x ray examination of the part involved should be the routine.

5 Basal metabolism studies x ray examination of the chest examination of the sputum and electrocardiograms are frequently necessary.

If this routine is observed classification is simplified and suitable treatment may be immediately instituted.

#### **CASE REPORTS**

The following report is submitted in some detail to illustrate the manner of attack employed in the treatment of a severe case of proliferative arthritis of infectious origin following measles.

**Case I** —A D G a boy aged twelve complained of pain in all the joints accompanied by marked limitation of motion duration six months.

On et He was perfectly well until February 1926 at which time he contracted measles. He was cared for by Dr W Hirsemann of Central Valley N Y and later by Dr C P Hussey of Suffern N Y and I am indebted to the e doctors for the privilege of studying the case. The child's immediate recovery was

uneventful. Following his convalescence he had indefinite arthritic pains until April 1926 at which time he had acute pain in the right leg later in the left leg both shoulders and both arms to and including the finger. His condition became markedly worse with a septic temperature and marked swelling of the joints involved accompanied by cardiac hypertrophy and marked enlargement of the spleen the latter organ being easily palpable beneath the costal margin. This condition reached its peak in eight days and persisted despite vaccines and palliative treatment.

He was admitted to the Post Graduate Hospital New York on October 20 1926. At that time the weight of the bedclothes would cause severe pain in the legs and ankles he was not able to feed himself on account of the marked involvement of the hands and arms and because of the limitation of motion in the mandible he could open his mouth only  $\frac{1}{2}$  inch. The tonsils were chronically diseased. The heart was hypertrophied extending 8.5 cm to the left of the midline in the fourth interspace there was a systolic murmur at the apex transmitted to the axilla. He had moderate dyspnea. The spleen was barely palpable beneath the costal margin.

Consultations were held with Drs Abraham Zingher R E Buckley S E King John F Erdmann and F Fuller.

#### *Laboratory work*

Blood culture Negative

Wassermann test Negative

Urinalysis Essentially negative

Chemical blood (10/23/26) Chlorides as NaCl 0.503 per cent sugar 0.9 per cent CO<sub>2</sub> combining power 54.1 c.c. CO per 100 c.c. plasma urea nitrogen 11

Blood grouping Group II Moss

Complete blood count (10/23/26) Red blood cells 3,560,000 hemoglobin 56 per cent leukocytes 7,000 polynuclears 84 per cent red blood cells tend to microcytosis and are paler than normal

Electrocardiogram (12/1/26) showed a sinus arrhythmia with depressed P and T deflections cause unknown. This was repeated April 15 1927 and showed P and T deflections in all lead prob

ably indicating myocardial changes which may have been due however to digitalis therapy

*Treatment*—First from the standpoint of focal infection the tonsils were removed by Dr Buckley then the defective teeth were removed under Dr Vaughn's service. Cultures were obtained from both and both showed *Streptococcus viridans* for which specific vaccines were prepared and administered. Fluids were forced as the result of a stool examination medicated colonic irrigations were given and alkalies by mouth also a special diet. Sponge baths were given as indicated. Because of the grave condition of the patient—his temperature sometimes reaching 105° F accompanied by marked secondary anemia as shown in the laboratory reports—three blood transfusions were given.

In the acute stages of the disease there was danger of ankylosis of the ankles and wrists to avert this plaster splints were applied to the arms and circular plaster casts to the legs—mal position being corrected. This was done on November 11 1926 at the time the tonsils were removed. On removal of the splints and casts it was found that no ankylosis had occurred and that greater motion was possible with a marked diminution of the pain. The results in the legs where circular casts were used were much better than in the arms where splints alone were applied. This would probably be accounted for by the fact that the immobilization was more complete. Following removal of the casts massage and physiotherapy were instituted and the patient was encouraged to use the members as much as possible. Palliative treatment in the form of salicylates to relieve pain was necessary only during the acute stages of the disease.

On May 8 1927 the patient was discharged from the hospital. He was able to walk unassisted having motion in both legs without pain there was still moderate limitation of motion in both wrists though the pain was largely gone.

After his discharge from the hospital the treatment consisted in non specific protein therapy, special diet, active motion massage and exposure to the sun as much as possible.

He was re admitted to the hospital on July 26 1927 with

typical signs of peritonitis which was accompanied by an exacerbation of the arthritic condition. After consultation it was decided that he could not stand any operative work and he died on August 18, 1927.

Permission for autopsy was obtained and the following findings were reported.

*Report of Autopsy Findings*—Except the joints of the thumbs whose ligaments are very lax and which crackle on motion the hands present the typical claw type there being immobility and enlargement at the proximal interphalangeal joints. The rest of the joints of the hands are movable with difficulty. The knees are enlarged to about the size of a large orange they can be straightened to an angle of about 160 degrees. No sign of acute inflammation externally.

**Chest** The pleural cavity is completely obliterated by dense fibrous adhesions. Lungs are crepitant throughout. In the right apex is a puckered depressed area dense and indurated which on section shows a point of caseation. Pericardial cavity is similarly obliterated except for a small posterior portion. Myocardium is brown and slabby. Along the contact point of the tricuspid valve are numerous minute gray to white vegetations. Between the two leaflets of the mitral valve is a small gray vegetation  $3 \times 2 \times 1$  mm. Aorta is very elastic with one or two small raised yellow patches.

**Abdomen** Extends to the third interspace on the left side and to the third rib on the right. Stomach is enormously distended with about one liter of sour smelling green fluid and a little air. Most of the gastric rugae have been flattened out by this distention. Liver is not enlarged yellowish brown in color. Gall bladder is distended with watery yellow clear bile. Spleen measures  $14 \times 8 \times 5$  mm and weighs 175 gram. Cut surface is quite pulpy reddish gray with indistinct Malpighian bodies. Adrenals are gray little or no yellow pigment being visible. Renal capsule strips easily leaving a smooth surface. The cut surface shows congestion and moderate swelling of the cortex. Intestines are not distended but the serosa everywhere is intensely congested with grayish white flakes of fibrinous eru-

date plastered here and there. There is quite a collection of gray firm exudate on the pelvic floor. Appendix is grossly, not acutely, inflamed but clean and gray. It is 5 cm long the distal third of the lumen being obliterated. Intestinal mucosa is pink with well formed *valvulae conniventes* contents thick fluid greenish yellow substance of foul odor. Parietal peritoneum is also deeply congested no free fluid observed in the abdominal cavity. Bladder is contracted.

**Joints** In addition to what is mentioned above both knee joints contain blood clots and plastic exudate over the much injected fatty plicae alares. There are several small recent hemorrhagic areas in the subsynovial layer. Except for a few slight depressions on the inner aspect of the lateral condyle of femur the articular surfaces are everywhere smooth. No articular changes are not grossly demonstrable.

**Microscopic**—Lungs Pleura is thickened showing shreds of torn fibrous bands. The vessels are injected. Section from the right apex presents a picture of a chronic granuloma consisting of conglomerate tubercles with central caseation and slight deposition of lime salts. Langhans giant cells and large and small round cell infiltration. There are numerous daughter tubercles whose centers are not yet necrotic.

**Heart** The greatly thickened pericardium is composed of numerous blood vessels loose and dense fibrous tissue and a few round cells. Throughout the myocardium are minute scars where the muscle fibers are atrophic and nuclei pyknotic. No typical Aschoff's bodies are demonstrable although there are occasional focal collections of small round cells.

**Gastrointestinal tract** Vessels are dilated and filled with red blood cells. The muscle layer of both the stomach and small intestine especially the latter are infiltrated with many polymorphonuclear leukocytes and round cells. Serosa at one point of the small intestine is covered with a thin fibrinopurulent layer here the suberosal vessels are very much more injected with marked polynuclear infiltration of the adjacent tissues. Sections from the mesenteric nodes show dilatation of the sinuses and injection of the blood vessels. In the appendix one sees

sinuses were clear. There was no history of venereal disease. Examination of the spine showed it to be rigid throughout and attempts at motion caused severe pain. Arthritis with right



Fig 16 —C II Ap I b d cat d

dorsal scoliosis and slight kyphosis was noted (Fig 163). The rest of the examination—including urinalysis, blood chemistry and stool examination—was essentially negative.



Fig 163 —C II Not th t p I mb p f p

Diagnosis Chronic infective arthritis of spine with one apical abscess as a possible focus of infection

*Treatment*—The abscessed tooth was extracted and physiotherapy given the patient was encouraged to take motion of the spine and also to secure as much sunlight as possible.

*Progress*—On June 8 1927 the pain was entire gone and there was much improvement in the motion of the spine.



Fig. 164—Case II Condition when patient was last seen showing marked improvement in lumbar segments

When last seen on January 3 1928 he had gained 5 pounds in the preceding two months was able to do any type of work without difficulty and stated that he regarded himself as being at least 80 per cent improved since first seen. An x-ray picture taken on this date showed a marked decrease in the arthritic process (Fig. 164).

That the final chapter in the treatment of arthritis has not been written is well illustrated by the following case report.

**Case III Proliferative Arthritis**—A R aged forty seven a civil engineer of English and French parentage was admitted to the Post Graduate Hospital August 28 1921 complainin of acute pain in many joints duration three years Discharged September 26 1921.

The condition began with pain in the ankles and gradually affected the knees hips shoulders elbows wrists fingers and spine During this time he steadily lost weight- 50 pound in all Nothing seemed to give more than palpation and many of the treatments caused a definite aggravation of the symptoms

**Past History**—He gave a history of having had typhoid malaria and childhood diaetes gonococcus infection in 1898 pleurisy in 1902 constipation for five years

**Past Treatments**—Atophan foci removed (a) Tonsils (b) 24 teeth (c) appendix Tincture of iodin by mouth colonic irrigations a great variety of diets salicylates in tremendous amounts magnesium sulphate orally and also bath tincture of digitalis iron quinin and strychnin streptococcus vaccines stock and autogenous protein serums milk injections two courses of extensive massage diathermy forty two baths at a famous resort stock serum and French serum antigenorrhreal treatments including massage of the prostate rectal diathermy bladder irrigations osteopathy

**Results**—In the course of his many serum treatment the patient had four anaphylactic shocks the last leaving him without motion in the right leg and hip The baths caused him to lose weight and definitely weakened him The removal of his tonsils caused an exacerbation of the disease The teeth and appendix were removed without effect During the summer of 1925 the patient developed an acute cardiac condition and was in bed for thirteen weeks when the knees hip and shoulder became acutely inflamed and swollen

When admitted to the hospital the patient suffered pain on the slightest movement and had limitation of movement in the joints and swelling in the shoulder elbows hip knee and ankles The muscles were spastic with a tension felt throughout the body and were inelastic and atrophic

*Special Examinations*—(1) Prostate Negative

(2) Nose and throat Suhacute laryngeal irritation

(3) Heart Slightly enlarged slight systolic murmur Blood pressure 100/65

(4) x Ray Teeth negative Lumbar spine negative

Hips, knees and hands The hip-joints show a narrowing of interarticular spaces, especially noticeable on the right side. Articular surfaces appear illuminated along with a moderate peri articular atrophy. In the knees a similar condition is noted. A similar process though perhaps less prominent is noticeable in other joints suggesting a polyarticular type of arthritis of probable systemic origin. In the right hip the process appears in transition with beginning hypertrophic changes.

Chest Moderate hilus root branch and central bronchial thickening

*Diagnosis*—Systemic polyarticular arthritis

*Laboratory Work*—(1) Wassermann examination negative

(2) Urine Very faint trace of albumin two other times negative

(3) Blood chemistry Urea nitrogen 10.1 sugar 0.077 chlorids as NaCl 0.519 CO combining power 48.5 cc per 100 cc plasma

(4) Icterus index 4.7 Van den Bergh direct negative in direct negative Fouchet negative

(5) Blood count Red blood cells 5,050,000 white blood cells 6,500 hemoglobin 80 per cent Differential count Polymorphonuclears 68 per cent transitionals 2 mononuclears 3 small lymphocytes 23 large lymphocytes 6 reds normal

(6) Examination of stools and cultures revealed nothing abnormal

(7) Dental examination showed nothing pathologic.

During the first week the patient ran an afternoon temperature of about 100.5 F after the eighth day the temperature dropped to about 99 F respirations 18 to 22 pulse averaged 85 to 90

*Treatment*—Ammonium O iodoxy benzoate and massage was the main program. Seven injections of 1 gram each were

given at intervals of two to three days Aspirin 10 grain was given after each injection to relieve the temporary discomfort Luminal  $\frac{1}{4}$  grain was given at night to aid rest

After the first injection the patient had a chill temperature 102 F and pulse 120 This is now believed to have been due to use of old sterile saline None occurred with subsequent injections Each injection was followed by pain in the affected joints for twenty four hours and then progressively greater relief Pain in the joints was lessened and after the sixth injection completely disappeared Greater motion became possible in all the joints with no pain whatever except in the muscles when they were put on a stretch The tension completely disappeared and the fever with it This was followed by a feeling of great easiness as after the subsidence of any long standing fever After the last treatment the patient was able to hobble on crutches for 50 or 60 feet to comb his hair for the first time in two years to move his arms freely and with considerable energy After a week in the sunshine he was discharged to continue management and exercise at home He had begun to take a keen interest in life and was feeling better than in three years His joints seemed to be quite movable as far as the contracted muscle tendons would allow movement The blood pressure was raised from 100/65 to 120/70

Fourteen weeks later the patient is maintaining the improvement gained in the hospital with greater motion in the arm but the movement in the legs continued to be greatly restricted because of the contracture of the ham string group of muscles unstretched for three years Whether or not these changes are permanent is a question yet unsolved There have been no joint pains since leaving the hospital

#### CONCLUSIONS

1 The treatment of a patient with arthritis should be based on a complete physical history and examination supplemented by all indicated laboratory work

2 Most cases can then be easily classified under one of the groups outlined in this article

3 The treatment of these cases requires a knowledge of the fundamental principles of orthopedic surgery medicine and physiotherapy and the close co operation of these departments

4 No single type of treatment is suitable for all cases and some remain refractory to all known methods

5 This summary with illustrative case reports emphasizes the detailed care required in treatment and the need for further work in this field

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CLINIC OF DRs RALPH COLP AND R T FINDLAY  
FROM THE SURGICAL SERVICE OF THE BEEKMAN STREET HOSPITAL

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### FRACTURES OF THE HUMERUS

THE object of this clinic is to present quite briefly a few facts gleaned from a study of 41 cases of fractures of the humerus treated in the wards of the Beekman Street Hospital New York City during the years 1926 and 1927. Although a much larger series might give us more accurate statistics still the information gained might at least be helpful because all these fractures were treated more or less in a routine fashion.

All of these cases were admitted to the hospital for treatment instead of being treated by ambulatory methods. At first glance this may appear reactionary but in the final analysis of this method the patient receives a much better immediate and final result and his ultimate period of incapacitation is less and his economic restoration is quicker.

As in fractures elsewhere age played but little part and the patients varied from twenty three months to eighty seven years of age males being affected more frequently than females. The mechanisms causing the fractures were of the usual varieties. Twenty one were due to indirect trauma that is falling on an arm or a shoulder. Eighteen were due to direct trauma for example, the arm being crushed or hit by some heavy object. Eight cases were due to both direct and indirect trauma and in one case a pathological fracture was caused by lifting a weight. The older the patients were the less trauma was required to cause the fracture. The location of the fracture the type of the fracture and the displacement of fragments will be seen tabulated in Tables 1, 2 and 3.

The treatment of fractures of the humerus may be divided into first aid treatment the hospital treatment, and the conva-

lescent care. The first aid treatment in a great majority of cases was administered by the ambulance surgeon. 24 cases were immobilized by a sling, 5 were fitted with a Thomas arm splint, 1 with a bass wood splint and 2 with adhesive strappings.

It must be borne in mind that one of the most important factors in the diminution of any shock is the immobilization of the bone fragments and unless this is effectively accomplished shock may be sufficiently increased to cause death. Slight shock is present in practically all simple cases and more especially in those in which there is a fracture of the shaft but it is in the compound fractures or cases complicated by some additional injury in which shock becomes quite severe.

After admission to the hospital the arm was placed in traction and suspension in 78 cases. The traction was obtained through the medium of molekin adhesive applied directly to the skin of the arm slightly proximal to the point of fracture the arm being abducted 90 degrees and rotated externally the forearm

TABLE 1  
LOCATION OF THE FRACTURE

	C	M
Right d	16	
1 st de	4	
Create tube or tr	8	
Th o st n o r c ei m pl t g d l t n o f h ld r	9	
Su g cal ch	3	
Anat m cal ch	1	
Both n k	6	
Shaft uppe th d	9	
Sh ft m ddle th d	3	
Sh ft l w th d	1	
S p ondyl	1	
E t r al ndyl	1	
I te n l o dyl	1	
L we p pl y l sepa t	2	

TABLE 2  
TYPE OF FRACTURE

	C	M
S m pl	38	
Compound	3	
Comminut d	6	
M itipl	10	
Impact d	7	

TABLE 3  
DISPLACEMENT OF FRAGMENTS

	Cases
Fragments overriding	3
Separation of fragments	4
Communition of fragments	6
Spiral fracture	3
Impacted fracture	6
Lower fragment displaced anteriorly	5
Lower fragment displaced posteriorly	1
Lower fragment displaced outward	7
Lower fragment displaced inward	2
Lower fragment displaced downward	1
Lower fragment displaced upward	3
Head rotated upward	2
Head rotated down ward	None
Head rotated inward	1
Head rotated outward	1
Greater tuberosity displaced upward	1
Lower epiphysis displaced posteriorly	1
Upper fragment displaced anteriorly	None
Upper fragment displaced posteriorly	None
Upper fragment displaced outward	1
Upper fragment displaced inward	None
Upper fragment displaced downward	None
Upper fragment displaced upward	None

TABLE 4  
COMPLICATION

There were 14 uncomplicated cases. In the remaining 27 cases there were forty-six complications many having more than one. Those that will be bearing on the fracture are

	Cases
Dislocation of the shoulder	6
Delayed union	2
Infection of soft parts	3
Osteomyelitis	1
Fracture of acromial process of scapula	2
Multiple fractures of the humerus	2
Skin abraded and macerated by adhesive	5
Temporary radial nerve paralysis	1

being suspended at a 90 degree angle to the arm. This was accomplished by the Blake board with the use of the Balkan frame. The method of application may be seen in the accompanying photograph (Fig. 165). The marked abduction of the arm must be obtained rather gradually in some cases as the pain may be too

severe when the arm is abducted to the full extent immediately. This abduction and external rotation is an essential part of the treatment and its importance cannot be too strongly emphasized. In 2 cases traction and suspension were used with the arm abducted between 45 and 90 degrees with the forearm extended in a

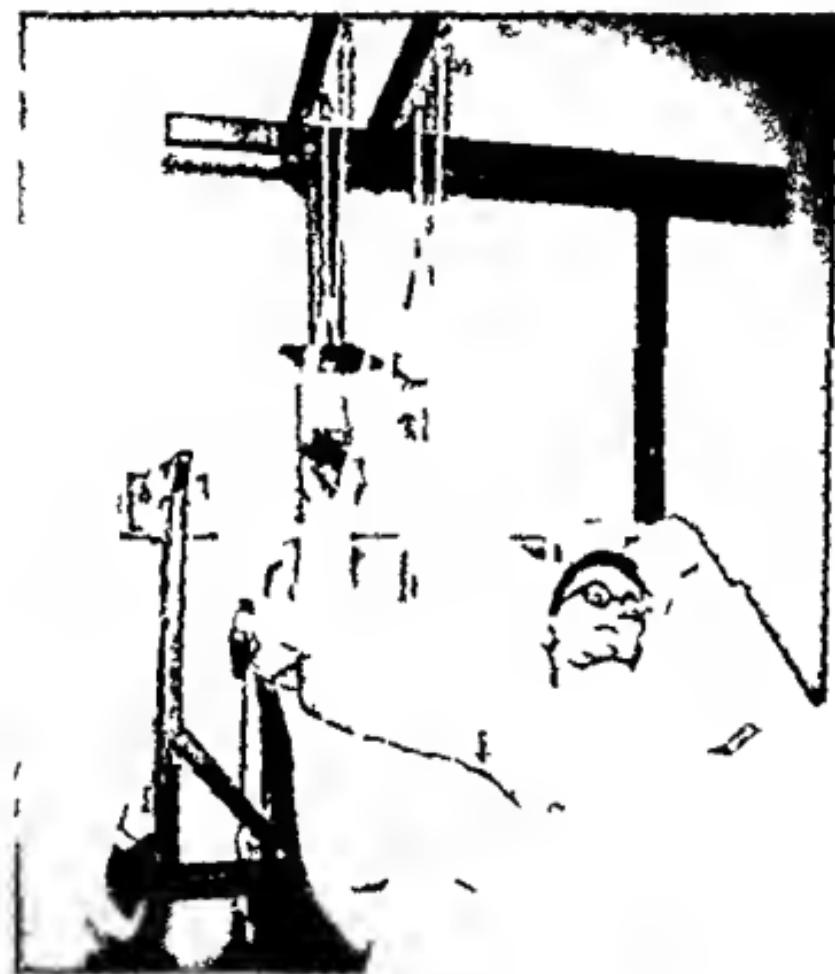


Fig 165

Thomas arm splint. Hhixter casts were used only in 3 cases. A sling with the arm in acute flexion (Jones position) was used in 5 cases of fracture involving the distal extremity of the humerus and a Velpeau bandage in 3 cases of impacted fracture of the anatomic neck.

It is exceedingly important that the proper weight be used

in obtaining traction. The amount of weight really depends upon the position of the fragment and the muscularity of the individual. The initial weight used averages about 10 pounds. Twenty four hours later a control x ray is taken and according to the position of the fragments more weight is added or some is removed. These x ray check ups taken by a portable apparatus are *sine qua non* in the treatment of fractures. Occasionally it may be necessary to administer an anesthetic for reduction purposes rather than add too much weight because the adhesive is very apt to slip or break when more than 12 pounds of traction are utilized. The following case may serve as an excellent example of the dangers of employing too much weight through the medium of skin traction.

A R male aged thirty one was admitted to the Beckman Street Hospital on June 6 1927 after being crushed between two cars. Physical examination disclosed a fracture in the middle third of the shaft of the left humerus. Inasmuch as the patient was in moderate shock morphin sulphate was administered by hypodermic external heat given and a temporary Thomas traction arm splint was applied by the ambulance surgeon. Upon entering the hospital the arm was put up in traction and suspension with a Blake board and 90 degrees abduction and external rotation was obtained and 8 pounds of weight was applied. Unfortunately there was marked overriding of the fragments so that at the end of twenty four hours the weight was accordingly increased to 20 pounds. At this junction the adhesive broke destroying the equilibrium of the apparatus. This was speedily repaired and the traction of 20 pounds was resumed. The position of the fragments was so good that the weight was reduced to 1/2 pounds about the twelfth day. The adhesive broke again resulting in a malalignment of the fragments. An attempt was made to reduce the fragments under anesthesia but this was found impossible because callus had been thrown out and union had occurred so that now only 5 pounds of traction were allowed to remain. At the end of six weeks the arm was removed from the traction suspension apparatus with a good functional but with a poor anatomic result. There was at least  $1\frac{1}{4}$  inch short.

ening. If an anesthetic reduction had been done during the first few days and then 10 or 12 pounds traction applied to hold the fragments in place there would doubtless have been a quicker economic restoration with a better anatomic result. In addition to this untoward and unnerving complication the skin of the arm is easily abraded and injured by too much traction causing pain and the possibility of infection. The latter naturally precludes an open operation which might be imperative to secure a reduction in this type of case. If the amount of weight is too much the adhesive frequently slips or gives away completely.

It is extremely important to continue traction and suspension for the proper length of time. This depends upon the simplicity of the fracture, the ease of reduction, the presence of clinical and x-ray bony union and in some cases the age of the patient. It must be granted that set rules cannot be followed in fracture work but twenty eight days are usually sufficient in simple non complicated cases. In this series traction varied between four and ninety days, the average time being thirty two days. After traction and suspension have been removed the arm is supported in a sling during the day and suspended at night. After a few days the night suspension may be discontinued. The Thomas arm splint with traction suspension with the forearm extended was used only in a few cases namely in those patients in which insufficient traction could be obtained by the ordinary methods and in which the skin of the upper arm had been macerated by adhesive traction and in cases in which the surgeon wishes to preserve the skin for later open operation. The Hennequin traction apparatus if carefully applied and watched is quite satisfactory especially in fractures occurring in the distal extremity of the humerus. It is a figure of 8 dressing using wide heavy muslin bandaged around the elbow which has been previously padded with cotton. Traction may be applied to the loose ends of the bandage and the arm suspended in the usual manner.

Following any fracture the restoration of function is extremely important and especially in those patients who depend for their livelihood upon the use of their arms. Physiotherapy

is a most valuable aid and an essential factor in the early restoration of function. It is extremely important not only to consider the time at which this treatment should be begun but the type and its frequency. Each case must be judged entirely upon its own merits and the treatments always should be under the direct supervision of a surgeon aided by a physiotherapist cognizant of surgical principles underlying the treatment of fractures. Dry heat so called radiant light may be used first. This may be instituted before there is evidence of union at the site of the fracture. Light massage too may be started before there is union in fact it may be instrumental in stimulating callus. Passive motion within the limit of pain is begun only after the surgeon can demonstrate union of the fragments. Active motion to a limited degree is encouraged from the onset in the cases which are in traction and suspension. It is this which gives this method its greatest advantage over plaster for the apparatus is so arranged that the patient never loses motion of the shoulder elbow and wrist joints. Following discharge from the hospital the patient receives heat massage active and passive motion continued intensively at regular intervals. It should be indelibly impressed upon the patient's mind that he is to move the arm as much as is possible and not depend solely upon the massage which he receives from the physiotherapist.

It is really interesting to note how infrequent open operation is necessary in cases treated by this method. An open operation was performed in 6 cases a Lane plate was used in 3 simple open reduction was done in 2 and chromic catgut suture of fragments in one.

When seen in the follow up the majority of cases had good end results and although there was some limitation of motion especially external rotation in the beginning this usually cleared up within six months to a year. A few of the good results were delayed by the fact that some of the patients were not conscientious in their physiotherapeutic treatments or that the fragments interfered with the function of a joint or muscle.



